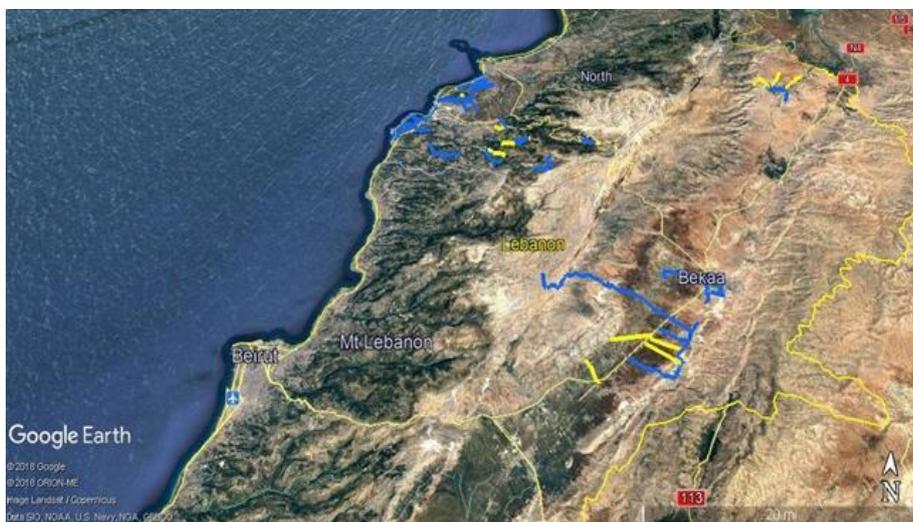




REPUBLIC OF LEBANON
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
LEBANON ROADS AND EMPLOYMENT PROJECT
LOT 5 - PACKAGE 1 - BATROUN CAZA

Final
March 2020



EXECUTIVE SUMMARY

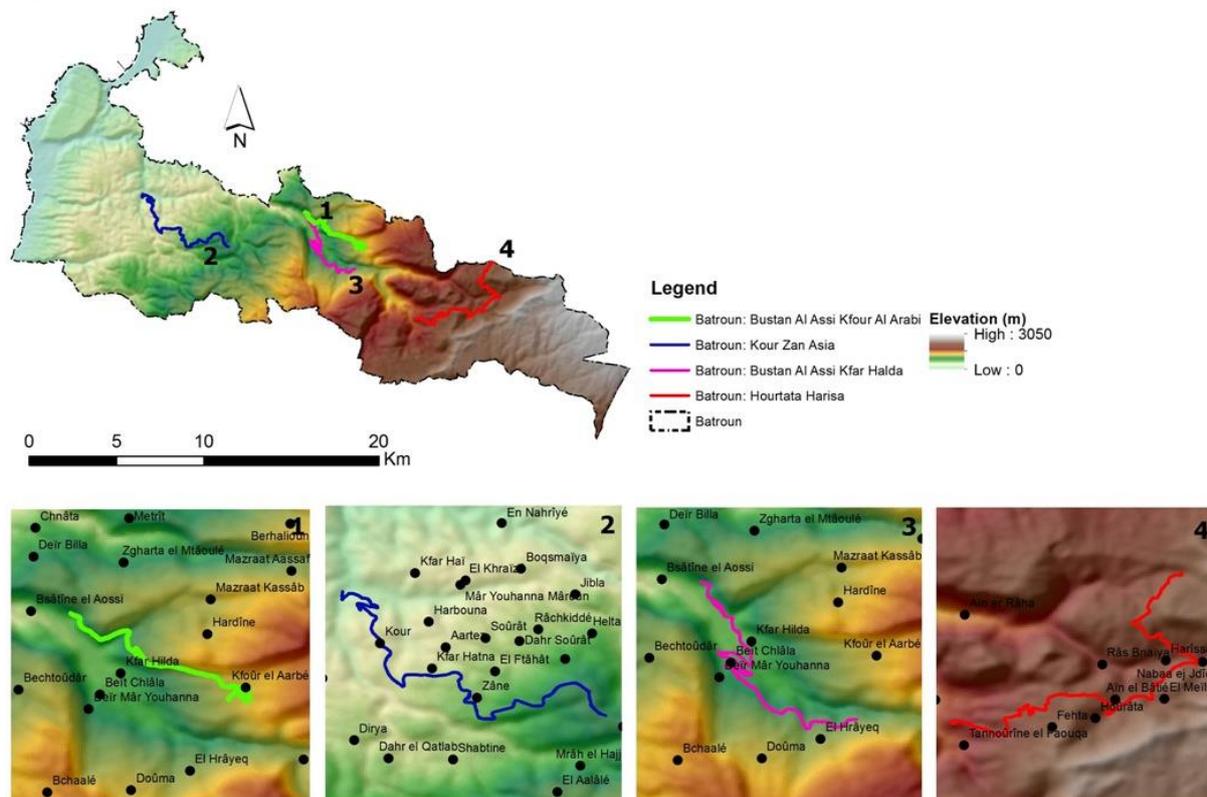
INTRODUCTION

The Government of Lebanon (GOL) has solicited and obtained World Bank (WB) financing for the Roads and Employment Project (REP). The Council for Development and Reconstruction (CDR) is acting as the executing agency on behalf of the GOL and its Council of Ministers (COM). The REP involves rehabilitation activities that are confined within the alignments of existing roads with no road widening, no involuntary resettlement, and no land acquisition. As such, the WB classified the REP as a category B project that require the preparation of an Environmental and Social Management Plan (ESMP) for its sub-components. Accordingly, a series of ESMPs were stipulated to be prepared for these roads and put together by CDR in packages for bidding purposes. In this context, CDR awarded the contract number 20379 to TEAM International, hereinafter referred to as the Consultant, to prepare the assessment, design and ESMPs for roads in the districts of Batroun, Bcharre, Koura, Tripoli, Baalbeck, and Hermel. This ESMP is concerned with roads within the Batroun district.

PROJECT DESCRIPTION

The REP consists of the rehabilitation, maintenance, and minor construction. Activities to be performed during the project vary between one road and the other, depending on the road rating in terms of the condition of the pavement, shoulders, potential flooding and drainage, potential landslide/soil erosion and retaining walls, and/or pedestrian walkways. In the Batroun district, four roads are proposed (Figure I) whose details are elaborated within the ESMP.

Figure I. Proposed roads within Batroun Caza (District)



- Road 4 starts at Tannourine El Faouqa at the existing Bcharre – Tannourine highway and extends for a length of about 11 km passing through the villages of Hourata and Harisa, until it reaches an end at the Batroun - Bcharre Caza limits.
- Road 5 starts at Aaqbet Fnaideq and extends approximately 3 km towards Kfar Halda, where it crosses the Jaouz River, and then continues for another 5 km along Batroun - Tannourine highway until it reaches the village of Hrayeq.
- Road 6 starts at Ain Aaya just outside the existing Batroun – Tannourine highway, and it extends for about 11 km passing through the villages of Kour, Zan, and Aassia.
- Roads 7N starts at Aaqbet Fnaideq and extends from about 10 km towards the village of Kfour El Arabi.

POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

The rehabilitation phase of any development is known to have potential adverse impacts on several indicators including traffic, air quality, noise level, construction waste, water and soil quality, landscape and visual intrusion, resources consumption, damage to existing utilities, health and safety, as well as socio-economics. During the rehabilitation phase, these impacts are temporary with the majority being minor or moderately negative (Table I). During operation, the rehabilitation of the road, combined with the natural increase in the vehicle fleet size, will ultimately increase traffic volume and hence, typical impacts associated with increased traffic will be inevitable in the long term. Yet, improved traffic flow on rehabilitated roads will lead to improved fuel efficiency and better engine performance, thereby reducing vehicle emissions and maintenance. Refurbished roads will lead to improved landscape and visual intrusion, albeit some increase in light glare. Finally, improved safety design of roads can reduce the potential for accidents. The magnitude and significance of these impacts is not the same along all roads. Based on the field surveys and environmental and social assessment, Road 6 encompasses a more sensitive and diversified environment because it passes close to a variety of residences and buildings and is the most populated amongst all roads. It features several commercial, residential, and religious buildings along its sides.

Table I. Summary of potential impacts of proposed roads in Batroun district

<i>Potential Impact</i>	<i>Rehabilitation phase</i>	<i>Operation phase</i>	
<i>Traffic</i>	Moderate negative	Minor negative to	Positive
<i>Air quality</i>	Minor negative	Minor negative to	Positive
<i>Noise</i>	Moderate negative	Minor negative to	Positive
<i>Biodiversity</i>	Moderate negative	Minor negative	
<i>Construction Waste</i>	Major negative	Neutral	
<i>Soil and water</i>	Moderate negative	Minor negative to Zero	
<i>Resources consumption</i>	Moderate negative	Neutral	
<i>Existing infrastructure</i>	Minor negative	Neutral to Positive	
<i>Visual Intrusion</i>	Minor negative	Minor negative to	Positive
<i>Health and Safety</i>	Moderate negative	Minor negative to	Positive
<i>Socio-Economic</i>	Moderate negative	to Positive	Positive
<i>Archaeology / Cultural Heritage</i>	Neutral	Neutral	
<i>Expropriation/involuntary resettlement</i>	Neutral	Neutral	

As for socio-economic impacts, during the rehabilitation phase, they are expected to be positive in terms of providing job opportunities and moderately negative in terms of temporary increase in travel time, impeded accessibility to residences / businesses, and potential health and safety and social tensions. During the operation phase, the rehabilitation of roads is expected to have positive impacts by improving access to remote areas, reduced trip times, reduced traffic congestion and accidents, and enhanced livelihood opportunities.

ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

Mitigation Plans

While the road rehabilitation is associated with some potential negative impacts, most of them can be alleviated. Tables II and

Table 7-2 III present a summary of environmental and Table IV of social mitigation measures that should be adopted to eliminate or minimize these impacts.

Table II. Environmental Mitigation Plan for the Batroun district roads during the rehabilitation phase

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility of mitigation</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
Traffic delays and congestion	<ul style="list-style-type: none"> ❑ Schedule transportation of construction materials during off - peak traffic hours and during night time. Generally peak traffic hours are from 7 to 10 am and from 3 to 6 pm. ❑ Develop routing strategies for construction-related traffic to avoid sensitive receptors ❑ Inform the public about the schedule of rehabilitation activities ❑ Maintain access to roadside businesses and residences via detours and temporary access features ❑ Ensure adequate warning, signing, delineation and channeling at least 500 m down and up-gradient from the construction site. ❑ Provide personnel to manage traffic at the rehabilitation site, supported by Municipal police if need be ❑ Avoid peak traffic times when laying asphalt and to the extent feasible, always keep part of the road accessible 	<ul style="list-style-type: none"> ❑ Contractor 	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks
Air emissions	<ul style="list-style-type: none"> ❑ Ensure adequate maintenance and repair of construction machinery and vehicles; ❑ Maintain good housekeeping practices that keep the site and its surroundings clean ❑ Ensure good quality of diesel fuel used with on-site equipment ❑ Turn off all equipment when not in use ❑ Sprinkle water on the construction site on windy days to hamper the generation of dust and its entrainment in the wind ❑ Ensure that excavated soil and fine construction material that are stored on site are properly sited away from the dominant wind direction and that they are watered and/or covered entirely by impervious sheeting when not in use ❑ Handle cement material properly ❑ Keep hauling routes free of dust and regularly cleaned ❑ Ensure good quality of fuel is used in trucks transporting construction material to and from site 	<ul style="list-style-type: none"> ❑ Contractor 	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility of mitigation</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
	<ul style="list-style-type: none"> ❑ Ensure optimum and regular transportation of construction materials to minimize storage of large heaps on-site and to minimize concentrated truck-trips. ❑ Cover all vehicles hauling materials likely to give off excessive dust emissions; ❑ Restrict vehicle speeds to 25km/h on unpaved roads and trucks 			
Increased noise levels	<ul style="list-style-type: none"> ❑ Use quiet/well-maintained equipment ❑ Regularly maintain equipment and turn them off when not in use ❑ Use operational noise mufflers ❑ Limit construction activities to working hours designated by decision number 2/163 – 31/1/1995 	❑ Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks
Biodiversity	<ul style="list-style-type: none"> ❑ Conduct careful rehabilitation work where the road crosses “Al Jaouz” river or passes next to the Tannourine Cedars Reserve in order to avoid damaging the nearby ecosystems. Isolate the stretch over the river with a 2 meter blocked fence ❑ Control workers’ movement and activities to avoid infringing on the nearby ecosystems including agricultural areas. ❑ Instruct workers to protect flora and fauna when feasible as well as their habitats. ❑ Prohibit dumping of solid and liquid waste into the natural environment ❑ Install speed bumps and animal crossing signage on Road 4 close to the Tannourine Cedar Reserve 	❑ Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks
Generation of construction waste	<ul style="list-style-type: none"> ❑ Minimize the generation of construction waste ❑ Adequately sort construction waste to remove any hazardous substances ❑ Reuse inert waste materials as filling material for road reconstruction where feasible ❑ Establish an arrangement with the municipality and the North Lebanon Governor to secure suitable locations for construction waste disposal 	❑ Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility of mitigation</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
Pollution of soil and water resources	<ul style="list-style-type: none"> <input type="checkbox"/> Minimize usage of chemicals (lubricants, oil, solvents) <input type="checkbox"/> Ensure the proper storage of building materials, asphalt, oil and chemicals on-site in well- controlled areas and away from river banks <input type="checkbox"/> Do not discharge wastewater into river or on soils <input type="checkbox"/> Do not discharge waste oil into rivers or on soils <input type="checkbox"/> Contractor to provide mobile/portable cabin toilet linked to the existing wastewater network. When the latter is absent within the work zone, the toilet is linked to a polyethylene storage tank that is emptied when full into the nearest wastewater network. <input type="checkbox"/> For vehicles and equipment, the Contractor will have to rent a land within the Project area. This land should be fenced and used for parking purpose only. The Contractor shall not perform any repair on site and is obliged to execute vehicles and equipment maintenance in a repair shop preferably located within the Project area. <input type="checkbox"/> Waste material or water containing waste chemicals such as thinners, oil, and mineral spirits shall not be pumped or disposed of into storm water drains, sanitary sewers or into the ground. <input type="checkbox"/> Cover any stockpiled construction material covered with an impermeable layer. <input type="checkbox"/> Store diesel in designated tanks away from the road maintenance site and drainage ditches. Place it on an elevated concrete base to prevent soil or water pollution in case of accidental spill at the specified storage location. <input type="checkbox"/> Conduct all refueling operations off-site. Fuel vehicles up before arriving to the road section. <input type="checkbox"/> Decrease water usage <input type="checkbox"/> Maintain surface water drainage <input type="checkbox"/> Ensure that in the event of any fuel or chemical spills, the affected area is attended to and that the top soil is removed for disposal. A spill response plan shall be in place and all 	<input type="checkbox"/> Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility of mitigation</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
	workers should be trained on its implementation.			
	<input type="checkbox"/> Control over vehicle hauling hazardous materials			
	<input type="checkbox"/> Clean the site periodically			
	<input type="checkbox"/> Each receptacle should be marked with the correct technical name of the substance it contains.			
	<input type="checkbox"/> Incompatible materials shall not be placed in common containment.			
	<input type="checkbox"/> Used or waste fuel or other waste chemicals shall be stored in an isolated area until collected for off-site disposal by an approved waste contractor.			
	<input type="checkbox"/> Vehicle and equipment wash-down should only be done in designated areas away from the road under rehabilitation to protect water and soil quality in the area.			
	<input type="checkbox"/> A collection system shall be provided under any machinery or equipment that may leak hydrocarbons (e.g. mobile generator).			
	<input type="checkbox"/> Control all operations involving the use of concrete to avoid leaching into water sources.			
	<input type="checkbox"/> Provide bins on-site for the disposal of non-construction related wastes			
	<input type="checkbox"/> Work with the municipality to include the site on the current solid waste collection route			
	<input type="checkbox"/> Minimize soil exposure time			
	<input type="checkbox"/> Install retaining walls before starting with drainage ditch excavations to block soil erosion			
	<input type="checkbox"/> Carry out excavations for drainage channels in complete precision and transport resulting excavated soil to offsite locations for proper disposal in case of contamination.			
	<input type="checkbox"/> Reduce the time excavated drainage channels remain unsupported			
	<input type="checkbox"/> Keep vegetation clearing to a minimum and encourage re-vegetation immediately after construction activity finishes, at sites where vegetation is removed,			
	<input type="checkbox"/> Place geotextile silt traps as appropriate			

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility of mitigation</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
Resources consumption	<ul style="list-style-type: none"> <input type="checkbox"/> Replace wet cleaning methods with dry clean-up methods whenever practical (sweeping, dust collection vacuum, wiping...etc.), while taking into consideration dust generation. <input type="checkbox"/> Install signs near water-using appliances to encourage water conservation. <input type="checkbox"/> Use appropriate water proof sheeting to cover the concrete after water curing to preserve moisture and reduce the evaporation that leads to decrease water quantities used <input type="checkbox"/> Turn off equipment when not in use <input type="checkbox"/> Regularly maintain machinery and generators and operate them in an efficient manner. <input type="checkbox"/> Do not leave vehicles idle for long periods. <input type="checkbox"/> Site offices shall be well insulated to retain heat or cool, utilize energy efficient bulbs and energy efficient cooling systems. <input type="checkbox"/> Reuse excavated material whenever feasible <input type="checkbox"/> Accept construction material only from permitted/licensed quarrying sites 	<input type="checkbox"/> Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks
Existing infrastructure	<ul style="list-style-type: none"> <input type="checkbox"/> Obtain road plans and elevation for each road <input type="checkbox"/> Develop procedures for rapid notification of the concerned municipality/ ministry, in the case of disruption of any existing utility, along, with requirements for immediate assistance with re-instatement, and close follow-up with concerned authorities 	<input type="checkbox"/> Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks
Visual intrusion	<ul style="list-style-type: none"> <input type="checkbox"/> Document existing conditions prior to initiation of the works <input type="checkbox"/> Preserve existing vegetation when feasible <input type="checkbox"/> Restore depleted vegetative cover by replanting with endemic trees (pine, oak, etc.) where cutting is necessary during construction. <input type="checkbox"/> Clearance all equipment, spoil heaps, and other materials after construction <input type="checkbox"/> 	<input type="checkbox"/> Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility of mitigation</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
Health and safety	<ul style="list-style-type: none"> <input type="checkbox"/> Follow CDR's and WB's safety, health and environmental regulations and guidelines <input type="checkbox"/> Ensure the construction sites are completely enclosed and restrict entrance to construction personnel <input type="checkbox"/> Create buffer zones around the site and provide pedestrian walk ways <input type="checkbox"/> Ensure traffic by-passes in working areas <input type="checkbox"/> Install clear warning signs <input type="checkbox"/> Provide adequate loading and off-loading space within the site itself <input type="checkbox"/> Provide appropriate personal protective equipment to construction workers, including helmets and earmuffs) <input type="checkbox"/> Provide on-site first aid kit with adequate content (ex. including antiseptic fluid, gauze, cotton etc. and other items that are needed to deal with any cuts and bruises) <input type="checkbox"/> Provide accident insurance for workers 	<input type="checkbox"/> Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks

Table III. Environmental Mitigation Plan for the Batroun district roads during the operation phase

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
Traffic congestion & delays	<input type="checkbox"/> Maintain road safety infrastructure	<input type="checkbox"/> MOPWT	<input type="checkbox"/> Municipality	Included as part of the construction and supervision activities for a one-year Defect Liability Period during operation.
Noise	<input type="checkbox"/> Provide speed limit signs at critical locations and enforce speed limit <input type="checkbox"/> Regularly maintain the roads	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	Included as part of the construction and supervision activities for a one-year Defect Liability Period during operation.
Biodiversity	<input type="checkbox"/> Refer to rehabilitation phase <input type="checkbox"/> Maintain lighting source <input type="checkbox"/> Maintain speed bumps and signage	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	Included as part of the construction and supervision activities for a one-year Defect Liability Period during operation.
Water and soil quality	<input type="checkbox"/> Maintain surface water drainage systems <input type="checkbox"/>	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	Included as part of the construction and supervision activities for a one-year Defect Liability Period during operation.

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
Resource consumption	<input type="checkbox"/> Using water-efficient equipment during maintenance operations to avoid excessive and overuse of water	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	Included as part of the construction and supervision activities for a one-year Defect Liability Period during operation.
Visual intrusion	<input type="checkbox"/> Ensuring that lights are turned off by a timer or manually when they are not needed.	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	Included as part of the construction and supervision activities for a one-year Defect Liability Period during operation.
Health and safety	<input type="checkbox"/> Follow CDR's and WB's safety, health and environmental regulations during maintenance works <input type="checkbox"/> Proper road management, signage and maintenance	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	Included as part of the construction and supervision activities for a one-year Defect Liability Period during operation.

Table IV. Social Mitigation Plan for the Batroun district roads during the rehabilitation phase

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
Socio-economics	<ul style="list-style-type: none"> <input type="checkbox"/> Inform the public about the schedule of construction activities <input type="checkbox"/> Provide alternative access to residences and roadside businesses <input type="checkbox"/> Adopt traffic management plans to ensure a safe and efficient movement of traffic <input type="checkbox"/> Develop and communicate clear criteria for job selection and allocation, with attention to ratio of Syrian and Lebanese community workers, types of positions and jobs restricted to Lebanese citizens, and consideration also for sub-group allocations within communities. <input type="checkbox"/> Ensure work permit requirements are satisfied in accordance to the Ministry of Labor regulations <input type="checkbox"/> Maintain labor registry and age verification record to protect against potential child labor <input type="checkbox"/> Ensure non-discrimination and fair treatment such as equal wages/benefits and working conditions among workers <input type="checkbox"/> Establish and ensure that GRM is applicable for communities and for workers (both Lebanese and Syrian workers) to file their complaints.. <input type="checkbox"/> Provide the option of anonymity under the GRM for communities and for workers (both Lebanese and Syrian workers) <input type="checkbox"/> Maintain a site construction insurance plan that covers all workers in case of injury or accidents during construction <input type="checkbox"/> Provide workers with the necessary training and awareness sessions on issues related to SEA/H 	<ul style="list-style-type: none"> <input type="checkbox"/> Contractor <input type="checkbox"/> CDR <input type="checkbox"/> Municipalities 	<ul style="list-style-type: none"> Supervision Consultant 	<p>Included as part of the construction and supervision activities.</p> <p>Contractor on-site engineer for HSE implementation amongst other tasks</p> <p>Consultant on-site engineer responsible for HSE supervision amongst other tasks</p>

Monitoring Plan

Since the project is a category B, monitoring activities for such projects rely primarily on visual observation and photographic documentation although measurements of certain indicators (traffic count, air / water quality and noise level) can be conducted upon public complaints. The project supervising consultant holds the responsibility of monitoring activities during the rehabilitation phase to ensure the implementation of the mitigation plan by the contractor. Upon public complaints, a third party (consultant) can also be appointed by CDR to conduct periodic monitoring with measurements of environmental indicators depending on the nature of the complaint. Table V presents a summary of monitoring indicators / activities during the rehabilitation phase.

During the operation phase, regular monitoring activities become more part of the duties and responsibilities of local municipalities and stakeholders. Similar to the rehabilitation phase, upon public complaints, a third party consultant can also be appointed by CDR (up to 2 years after project completion) to conduct periodic monitoring with measurements of environmental indicators depending on the nature of the complaint (Table VI).

During the rehabilitation phase, the Supervising Consultant shall submit a quarterly report about the monitoring activities to various stakeholders including the CDR and the municipalities. These reports shall be made readily available or accessible to the public upon submittal. The content of a typical report should mirror the indicators of the mitigation plan with proper photographic documentation and actions taken in the event of accidents, concerns or complaints.

Table V. Environmental and Social Monitoring Plan for the Batroun district roads during the rehabilitation phase

Impact	Monitoring activities	Responsibility	Frequency/ Duration	Location	Methods	Estimated Cost ¹
Traffic	Continuous supervision with periodic photographic documentation of mitigation measures (congestion, traffic disruption, speed limits, working hours, the presence of a traffic police and construction worker at detours)	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
Air quality	Continuous supervision with periodic photographic documentation of mitigation measures (vehicle and excavation emissions, turning off of equipment not in use, equipment maintenance, type of fuel used on site and in hauling trucks, speed limits, cleanliness of site, water spraying, storage conditions of soil and fine construction material, working hours, schedule of material transportation	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
	Total Suspended Particles (TSP), PM ₁₀ , PM _{2.5} (wherever feasible), SO _x , NO _x and CO	Third party Consultant CDR	Upon public complaint	At site and at sensitive receptors within 100 m from site	1-hr measurements, and visual observation of dust dispersion (scale and direction)	2000\$/event

Noise	Continuous supervision with periodic photographic documentation of mitigation measures (equipment mufflers, equipment maintenance, equipment turned off when not in use, speed limits, working hours) and measurements of indicators in case of public complaints	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
	L_{eq} , L_{min} and L_{max}	Third party Consultant CDR	Upon public complaint	At site and at sensitive receptors within 100 m from site	Single sample per location (average 1hr reading-15min intervals) during morning (7-8am), evening (1-2pm) and night (4-5pm)	500\$/ event
Biodiversity	Continuous supervision with periodic photographic documentation of mitigation measures (worker movement and activity, waste disposal, etc.)	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
Construction and other solid waste	Continuous supervision with periodic photographic documentation of mitigation measures while maintaining a record of waste generation, collection, segregation, storage, transportation and disposal in terms of type, quantity, and disposal location of generated waste	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
Runoff water/ drainage	Continuous supervision with periodic photographic documentation (chemical usage, chemical and material storage, water usage, bins for solid waste disposal, wastewater discharge from mobile/portable toilets and storage tanks in existing / nearby sewage network. oil spill management) while checking on culverts particularly following rainfall events	Supervising Consultant Contractor	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks

	Water quality analysis	Third party Consultant CDR	Upon public complaint	At nearby river/ stream	Totals suspended solids, BOD, COD, Oil/grease	1000\$/ event
Resource consumption	Continuous supervision with periodic photographic documentation of reuse of excavated material, water and energy conservation practices and design elements	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
Existing infrastructure	Continuous supervision with periodic photographic documentation of excavation and response to disruption of underground utilities	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
Visual intrusion	Continuous supervision with periodic photographic documentation of excavation and re-planting / re-vegetation while checking on culverts particularly following rainfall events	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
Health and Safety	Continuous supervision with periodic photographic documentation (PPE, site enclosure, buffer zones, warning signs, first aid kit, accident insurance), while maintaining a record of injuries / accidents specifying cause and location	Supervising Consultant Municipality	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
Socio-economic	Continuous supervision with periodic photographic documentation of mitigation measures while maintaining a record of employment and grievance, sharing construction schedule with the public, access to roadside businesses and residences, and grievance record. Documentation of training and raising awareness for SEA/H and signing of the code of conduct as well as record of age verification against child labor.	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks

Table VI. Environmental and Social Monitoring Plan for the Batroun district roads during the operation phase (up to a year after project completion)

Impact	Monitoring activities	Responsibility	Frequency/ Duration	Location	Methods	Estimated Cost
Air quality	Total Suspended Particles (TSP), PM ₁₀ , PM _{2.5} (wherever feasible), SO _x , NO _x and CO	Third party Consultant	Upon public complaint	At site and at sensitive receptors within 100 m from site	1-hr measurements, and visual observation of dust dispersion (scale and direction)	2000\$/event
Noise	L _{eq} , L _{min} and L _{max}	Third party Consultant	Upon public complaint	At site and at sensitive receptors within 100 m from site	Single sample per location (average 1hr reading-15min intervals) during morning (7-8am), evening (1-2pm) and night (4-5pm)	500\$/ event
Water	Totals suspended solids, BOD, COD, Oil and grease	Third party Consultant	Upon public complaint	At nearby river/ stream	Single sample analytical analysis	1000\$/ event

CONSULTATION, DISCLOSURE AND GRIEVANCE REDRESS MECHANISM

Public Consultation

A public consultation meeting was conducted on December 20, 2019 with the Federation of Municipalities of the Batroun district during which the ESMP results were presented (see Annex D). Thirty four individuals attended the meeting including 20 heads of municipalities in the Batroun district and 8 females (Figure 8-1). Several issues were raised during the meeting with the Federation such as:

- ❑ This project is funded through a loan and not a grant. The money for this loan should have been used for projects that are more vital than rehabilitation of roads.
- ❑ Many complained that they were not aware of this project until now. It was explained that the project was discussed with outgoing municipal heads, serving before the latest municipal elections.
- ❑ The selection criteria applied for road selection are not clear and transparent. It seems that political considerations played a significant role, as there are roads that are in need of rehabilitation more than the proposed ones. It was agreed that the municipalities, via the Federation, will prepare a list of additional roads that require rehabilitation and will submit the list to CDR for consideration in a phase 2 of the project.
- ❑ Employment opportunities were discussed for both Lebanese and Syrian workers. The latter contributes significantly in the construction sector throughout Lebanon including the Batroun District. Besides private entities, the municipalities are resorting to Syrian labor in this sector in particular. There appears to be a clear split in job types between local communities. The delineation line is between skilled jobs (mainly taken by the Lebanese workforce) and unskilled labor (filled primarily by Syrian workers). This split has resulted in a control of potential tensions or conflict between the communities.
- ❑ There are some sections of the proposed roads that have recently undergone rehabilitation works. Could the allocated budget be transferred to additional works along those roads?
- ❑ The concerned municipalities want to see the roads design maps to provide their opinion on the proposed rehabilitation elements. It was agreed that this can be accommodated in subsequent meetings upon the request of the Federation either with the Consultant's Engineer and with the Contractor prior to initiation of construction activities.
- ❑ There are decrees for expropriation at the Ministry of Public Works and Transport for the selected roads. These should be taken into consideration when rehabilitating the roads particularly with respect to the road width because at many locations the existing pavement may not be at full width of the road.

A separate meeting was conducted with female attendees to capture their concerns. They emphasized that:

- ❑ Initiating the project works and not terminating them at all, or on time, hence prolonging the nuisance to the public should be avoided.
- ❑ Public concerns should be respected during project execution.
- ❑ Using construction material that is of good quality and that does not deteriorate rapidly, as per the agreed terms of reference.
- ❑ Avoiding the destruction of existing road elements such as signage that are in good condition and that have been installed through private initiatives. It is recommended to keep the existing ones and use surplus in funding to add other elements along the roads.
- ❑ Planting trees along the rehabilitated roads and landscaping the roundabouts.

- ❑ Encouraging the municipalities to conduct direct supervision of the works, to ensure that they are up to the agreed standards.
- ❑ Presenting the design maps to the engineering department at the Federation of Municipalities of the Batroun Caza to give their technical opinion.
- ❑ Stressing on the contractor to employ local people from the towns where the roads rehabilitation is taking place.

As for NGOs Consultation, this ESMP has targeted them according to their position in Lebanon. They consist of two levels as follows: (1) Local: they are specific to each Caza. Their mission is to address different concerns and issues among the local society including social, economic, gender equality, environment, poverty, women empowerment, etc. and (2) International: they are cover the whole country and their consultation will be applied to all the ESMPs of the REP. When the crisis in Syria erupted in early 2011, numerous International NGOs responded to the humanitarian crisis and worked directly with the Syrians in Lebanon by providing aid and responding to their critical situation.

A grievance redress mechanism (GRM) is established by the CDR to allow internal and external stakeholders to voice their concerns during the project phases: pre-construction, construction, and operation. The GRM is designed to allow a timely resolution of concerns, assuring stakeholders that grievances have been heard at various levels and that the institutionalized mechanism will yield a fair and impartial outcome. Furthermore, the grievance mechanism is applicable for communities and for workers (both Lebanese and Syrian workers) with the option to remain anonymous when filing a grievance to encourage workers to speak out without potential fear of repercussions.

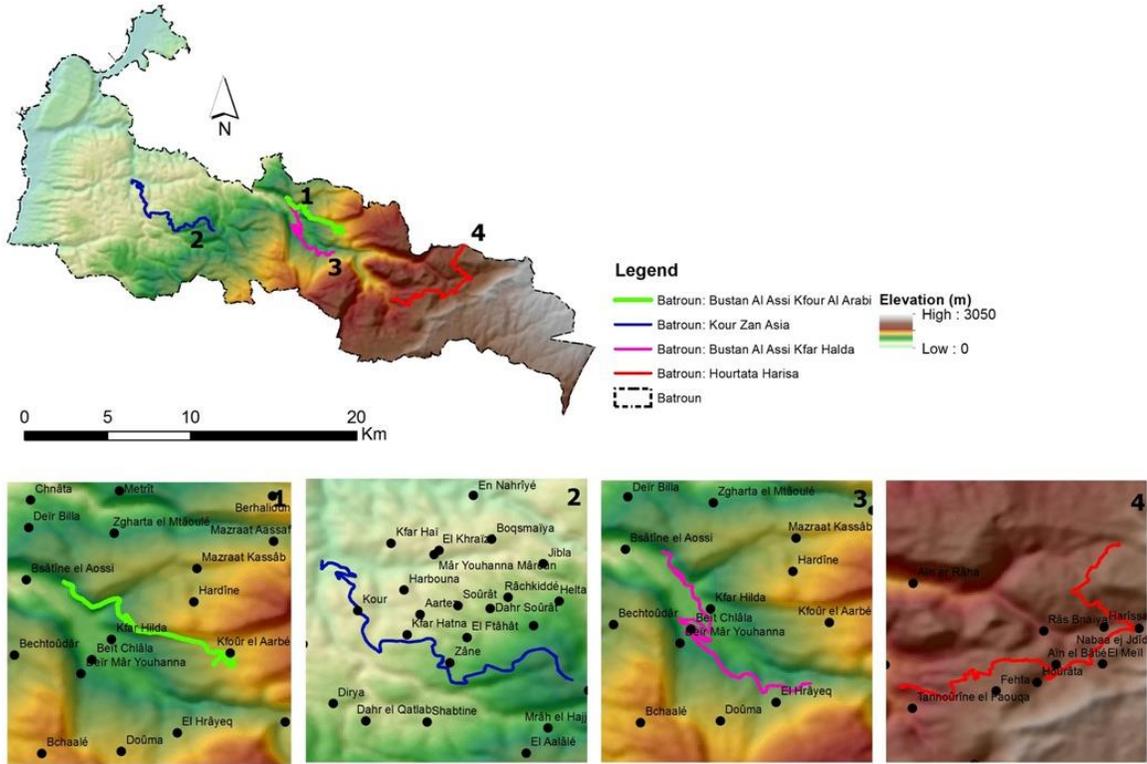
الملخص التنفيذي

حصلت الحكومة اللبنانية على تمويلاً من البنك الدولي (البنك) لصالح مشروع للطرق والعمالة (المشروع). ويقوم مجلس الإنماء والإعمار (المجلس) بدور الجهة المنفذة لصالح الحكومة اللبنانية ومجلس الوزراء. يشمل المشروع أنشطة تأهيلية محصورة بمسارات الطرق الحالية ولا ينطوي على توسيعات لها، ولا إعادة إسكان قسرية، ولا أية استملاكات. وبناء عليه صنف البنك المشروع تحت فئة ب التي تستدعي تحضير خطة الإدارة البيئية والاجتماعية (الخطة) لمكونات المشروع الجزئية. وبناء على ذلك توجب إعداد تصاميم لهذه الطرق التي وضها المجلس في رزم لأغراض طرح مناقصات التنفيذ. وفي هذا المجال وقع المجلس عقداً مع تيم انترناشيونال (الاستشاري) تحت رقم ٢٠٣٧٩ لإعداد التقييم والتصميم وإعداد خطط الإدارة البيئية والاجتماعية للطرق في أفضية البترون، بشري، الكورة، طرابلس، بعلبك والهرمل. وهذا التقرير يخص خطة الإدارة البيئية والاجتماعية في قضاء البترون.

وصف المشروع

المشروع هو كناية عن تأهيل وصيانة و إنشاءات ثانوية. والأنشطة التي ينبغي القيام بها تختلف بين طريق وآخر، حسب تقييم الطريق، من حيث حالة طبقة الرصف، الأكتاف، صرف مياه الأمطار و احتمال اغراق الطريق، احتمال الانهيارات وجرف التربة، جدران الدعم و/أو ممرات المشاة. والطرق المقترحة في قضاء البترون هي أربعة (الشكل ١) مفصلة ضمن الخطة.

الشكل ١ . الطرق المقترحة للتأهيل في قضاء البترون



- الطريق رقم ٤ تبدأ من تتورين الفوقا على طريق بشري- تتورين وتمتد على طول ١١ كم مارة بقرى حوراتا وحريصا وتنتهي عند الحدود بين قضاءي البترون وبشري
- الطريق رقم ٥ تبدأ من عقبة فنيديق وتمتد لمسافة ٣ كلم نحو كفر حلدا حيث تعبر نهر الجوز وتمتد ٥ كم أخرى بموازية طريق البترون- تتورين حتى قرية حرايق.
- الطريق رقم ٦ من عين ايايا بالقرب من طريق بترون تتورين وتمتد لمسافة ١١ كلم مارة بقرى كور، زان، وعاصية.
- الطريق 7N تبدأ من عقبة فنيديق وتمتد لمسافة ١٠ كلم نحو قرية كفور العربي.

الآثار البيئية والاجتماعية المحتملة

من المعروف أن أية عملية تأهيل يمكن أن ينتج عنها تأثيرات سلبية على عدة مؤشرات تشمل حركة المرور، نوعية الهواء، مستوى الضجيج، مخلفات الإنشاءات، المياه والتربة، المناظر الطبيعية والتداخل البصري، استهلاك الموارد، ضرر على الخدمات العامة، الصحة والسلامة، بالإضافة إلى التأثيرات الاقتصادية والاجتماعية. تكون هذه التأثيرات أثناء عملية التأهيل ظرفية وفي غالبيتها غير ذات بال أو سلبية لدرجة معتدلة (الجدول ١). وفي مرحلة التشغيل سينتج عن عملية التأهيل مضافاً إليها النمو الطبيعي في حجم اسطول

المركبات زيادة في الحركة المرورية لا يمكن تفاديها في المدى الطويل. ولكن تحسن تدفق المركبات على الطرق المؤهلة سيؤدي إلى تخفيض استهلاك الوقود وكفاءة أعلى في تشغيل محركات المركبات، مما يخفض انبعاثاتها واحتياجاتها للصيانة. وتأهيل الطريق يؤدي إلى تحسين مظهر المناظر الطبيعية ولكن أيضاً يؤدي إلى زيادة في وهج الضوء. وأخيراً فإن تحسين تصميم الطريق يؤدي لسلامة أفضل يخفض مخاطر الحوادث المحتملة. إن مقدار وأهمية هذه التأثيرات ليست نفسها على جميع الطرق. وبناء على المسح الميداني والتقييم البيئي والاجتماعي ، تبين أن الطريق رقم ٦ تحتوي على وضع حساس وبيئة متنوعة لأنها تمر بالقرب من مساكن ومبانٍ متنوعة وتمر في منطقة مسكونة مقارنة بالطرق الأخرى. فعلى جنبها تقع عدة مبان تجارية وسكنية ومراكز للعبادة.

الجدول ١ - ملخص الاثر البيئي و الاقتصادي المحتمل لتأهيل الطرق في قضاء البترون

الأثر المحتمل	مرحلة التأهيل	مرحلة التشغيل
حركة المرور	سلبى معتدل	سلبى ضئيل الى ايجابي
نوعية الهواء	سلبى ضئيل	سلبى ضئيل الى ايجابي
الضجيج	سلبى معتدل	سلبى ضئيل الى ايجابي
التنوع البيولوجي	سلبى معتدل	سلبى ضئيل
فضلات الانشاءات	سلبى كبير	محايد
التربة و الماء	سلبى معتدل	سلبى ضئيل الى صفر
استهلاك الموارد	سلبى معتدل	محايد
البنى التحتية الموجودة	سلبى ضئيل	محايد الى ايجابي
التلوث البصري	سلبى ضئيل	سلبى ضئيل الى ايجابي
الصحة و السلامة	سلبى معتدل	سلبى ضئيل الى ايجابي
الاجتماعي-الاقتصادي	سلبى معتدل	الى ايجابي ايجابي
الأثار/الارث الثقافي	محايد	محايد
استملاكات الأراضي/اعادة الاسكان غير الطوعي	محايد	محايد

أما من حيث التأثيرات الاجتماعية-الاقتصادية خلال مرحلة التأهيل فينتظر أن تكون ايجابية لأنها توفر فرصاً للعمل، وسلبية باعتدال بسبب الزيادة المؤقتة في وقت التنقل وصعوبة الوصول إلى المساكن/ وأماكن التجارة وإمكانية التأثيرات السلبية على الأمان والصحة وما قد تحدثه من التوترات الاجتماعية. أما خلال مرحلة التشغيل فتأهيل الطرق إيجابي من ناحية تحسين الوصول للأماكن النائية وخفض طول الرحلات الزمني وتقليل الازدحام المروري والحوادث، وكذلك تعزيز فرص كسب الرزق.

خطة الإدارة البيئية والاجتماعية والرصد

خطط التخفيف

رغماً عن أن لإعادة تأهيل الطرق بعض الآثار السلبية ولكنها بمعظمها يمكن تخفيفها. يظهر الجدولان ٢ و ٣ ملخصاً للإجراءات البيئية والجدول 4 يلخص إجراءات تخفيف الأثر الاجتماعي التي ينبغي اتباعها للتخلص من الآثار السلبية أو الحد منها.

الجدول 2 : خطة التدابير التخفيفية البيئية لطرق قضاء البترون خلال مرحلة التأهيل

التكلفة المقدرة	مسؤولية الإشراف المباشر	مسؤولية التخفيف	تدابير التخفيف المقترحة	الآثار المحتملة
مشمولة كجزء من أنشطة البناء والإشراف. مهندس المقاول في الموقع المسؤول عن الصحة و السلامة و البيئة من بين مهام أخرى مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهام أخرى	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهام أخرى	<input type="checkbox"/> المقاول <input type="checkbox"/> البلديات	<input type="checkbox"/> جدولة نقل مواد البناء خارج ساعات الذروة وخلال الليل. ذروة ساعات حركة المرور هي عموما من ٧ إلى ١٠ صباحا ومن ٣ إلى ٦ مساء. <input type="checkbox"/> وضع استراتيجيات لمسارات حركة المرور المتعلقة بالبناء لتجنب المستقبلات الحساسة <input type="checkbox"/> إعلام الجمهور بجدول أنشطة إعادة التأهيل <input type="checkbox"/> الحفاظ على إمكانية الوصول إلى المؤسسات والمساكن على جانبي الطريق باستحداث تحويلات وميزات الوصول المؤقتة <input type="checkbox"/> اشارات تنبيه و انذار قبل ٥٠٠ م من مواقع الأشغال <input type="checkbox"/> توفير موظفين لإدارة حركة المرور في موقع إعادة التأهيل، بدعم من الشرطة البلدية إذا لزم الأمر <input type="checkbox"/> تجنب أوقات الذروة المرورية خلال السفلة وإلى أقصى حد ممكن، وجدولة الأشغال خارج ذروة موسم الاصطياف مع الحفاظ دائما على جزء من الطريق مفتوحا للسيير.	عرقلة حركة المرور والأزدحام
مشمولة كجزء من أنشطة البناء والإشراف. مهندس المقاول في الموقع المسؤول عن الصحة و السلامة و البيئة من بين مهام أخرى مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهام أخرى	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهام أخرى	<input type="checkbox"/> المقاول	<input type="checkbox"/> ضمان الصيانة والإصلاح الكافيين لآلات الانشاء والمركبات؛ <input type="checkbox"/> الحفاظ على ممارسات التدبير المنزلي الجيدة التي تحافظ على نظافة الموقع والمناطق المحيطة به <input type="checkbox"/> ضمان نوعية جيدة من وقود الديزل المستخدم للمعدات في الموقع <input type="checkbox"/> إيقاف تشغيل محركات جميع المعدات عندما لا تكون مستخدمة <input type="checkbox"/> رش المياه على موقع العمل في الأيام العاصفه لإعاقة انتشار الغبار و ابعده عن مهب الرياح <input type="checkbox"/> التأكد من أن التربة المحفورة ومواد البناء الدقيقة المخزنة في الموقع توضع بشكل صحيح بعيدا عن اتجاه الرياح السائد، وأن تسقى بالماء و/أو تغطيها بالكامل الأغشية المنيعة عندما لا تكون قيد الاستخدام <input type="checkbox"/> التعامل مع مواد الأسمت بشكل صحيح <input type="checkbox"/> الحفاظ على مسارات نقل المواد خالية من الغبار وتنظيفها بانتظام <input type="checkbox"/> ضمان استخدام نوعية جيدة من الوقود في الشاحنات التي تنقل مواد البناء من وإلى الموقع <input type="checkbox"/> ضمان النقل الأمثل والمنتظم لمواد البناء لتقليل تخزين أكوام كبيرة في الموقع وتقليل رحلات الشاحنات المركزة إلى أدنى حد. <input type="checkbox"/> تغطية جميع المركبات التي تنقل المواد التي يحتمل أن تؤدي إلى انبعاثات غبار مفرطة؛ <input type="checkbox"/> تقييد سرعة الآليات إلى ٢٥ كم/ساعة على الطرق غير المعبدة	الانبعاثات الهوائية
مشمولة كجزء من أنشطة البناء والإشراف. مهندس المقاول في الموقع المسؤول عن الصحة و السلامة و البيئة من بين مهام أخرى مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهام أخرى	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهام أخرى	<input type="checkbox"/> المقاول	<input type="checkbox"/> استخدام معدات هادئة / مصانة بشكل جيد <input type="checkbox"/> صيانة المعدات بانتظام وإيقاف تشغيلها عندما لا تكون مستخدمة	زيادة مستويات الضوضاء

التكاليف المقدرة	مسؤولية الإشراف المباشر	مسؤولية التخفيف	تدابير التخفيف المقترحة	الآثار المحتملة
الصحة و السلامة و البيئة من بين مهام أخرى مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهام أخرى	الإشراف على الصحة و السلامة و البيئة بين مهام أخرى		استخدام كاتم صوت الضوضاء التشغيلية قصر أنشطة إعادة التأهيل على ساعات العمل المحددة بموجب القرار رقم ١٦٣/٢ - ١٩٩٥/١/٣١	
مشمولة كجزء من أنشطة البناء والإشراف. مهندس المقاول في الموقع المسؤول عن الصحة و السلامة و البيئة من بين مهام أخرى مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهام أخرى	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة بين مهام أخرى	المقاول	القيام بأعمال تأهيل دقيقة حيث يعبر الطريق نهر "الجوز" أو يمر بجوار محمية أرز تنورين من أجل تجنب الإضرار بالنظم الإيكولوجية القريبة: عزل الامتداد فوق النهر بسياج مسدود بمتريين. مراقبة حركة العمال وأنشطتهم لتجنب التعدي على النظم الإيكولوجية المجاورة بما في ذلك المناطق الزراعية. إرشاد العمال إلى حماية النباتات والحيوانات عندما يكون ذلك ممكنا و كذلك موائلها. حظر إلقاء النفايات الصلبة والسائلة في البيئة الطبيعية تثبيت مطبات السرعة و لاقطات عبور الحيوانات على الطريق ٤ بالقرب من محمية أرز تنورين	التنوع البيولوجي
مشمولة كجزء من أنشطة البناء والإشراف. مهندس المقاول في الموقع المسؤول عن الصحة و السلامة و البيئة من بين مهام أخرى مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهام أخرى	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة بين مهام أخرى	المقاول	تقليل توليد نفايات الانشاءات فرز نفايات الانشاءات على نحو كاف لإزالة أي مواد خطيرة إعادة استخدام مواد الانشاءات الخاملة كمواد ملء لإعادة بناء الطرق حيثما كان ذلك ممكنا وضع ترتيب مع البلدية ومحافظة شمال لبنان لتأمين مواقع مناسبة للتخلص من نفايات الانشاءات	نفايات الانشاءات
مشمولة كجزء من أنشطة البناء والإشراف. مهندس المقاول في الموقع المسؤول عن الصحة و السلامة و البيئة من بين مهام أخرى مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهام أخرى	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة بين مهام أخرى	المقاول	التقليل إلى أدنى حد من استخدام المواد الكيميائية (زيوت التشحيم والزيوت والمذيبات) ضمان التخزين السليم لمواد البناء والأسفلت والنفط والمواد الكيميائية في الموقع في المناطق الخاضعة للرقابة بشكل جيد وبعيدا عن ضفاف الأنهار عدم تصريف مياه الصرف الصحي في الأنهار أو في التربة عدم تصريف نفايات النفط في الأنهار أو على التربة على المقاول توفير مرحاض المقصورة النقل / المحمولة المرتبطة بشبكة مياه الصرف الصحي القائمة. عندما يكون هذا الأخير غير متوفر داخل منطقة العمل، يرتبط المرحاض إلى خزان من البولي إيثيلين يتم تفريغها الكامل في أقرب شبكة مياه الصرف الصحي. بالنسبة للمركبات والمعدات، سيتعين على المقاول استئجار أرض داخل منطقة المشروع. يجب تسييج هذه الأرض واستخدامها لغرض وقوف	تلوث التربة والموارد المائية

الآثار المحتملة	تدابير التخفيف المقترحة	مسؤولية التخفيف	مسؤولية المباشر	الإشراف	التكلفة المقدرة
	المركبات حصرا. لا يجوز للمقاول إجراء أي إصلاح في الموقع وهو ملزم بتنفيذ صيانة المركبات والمعدات في ورشة إصلاح يفضل أن تكون موجودة داخل منطقة المشروع.				
	لا يجوز ضخ أو التخلص من النفايات السائلة أو المياه التي تحتوي على مواد كيميائية ، مثل الزيوت، والأرواح المعدنية، أو التخلص منها في مصارف مياه الأمطار أو المجاري الصحية أو في باطن الأرض.				
	تغطية أي مواد بناء مخزونة بغطاء غير قابل للاختراق.				
	تخزين الديزل في خزانات مخصصة بعيدا عن موقع صيانة الطرق وقنوات تصريف المياه و وضعه على قاعدة خرسانية مرتفعة لمنع تلوث التربة أو المياه في حالة الانسكاب العرضي في موقع التخزين المحدد.				
	إجراء جميع عمليات التزود بالوقود خارج الموقع. مركبات نقل الوقود تبقى قبل الوصول إلى مواقع العمل.				
	تقليل استخدام المياه				
	الحفاظ على تصريف المياه السطحية				
	التأكد من أنه في حالة حدوث أي انسكابات الوقود أو المواد الكيميائية، يتم الاهتمام بالمنطقة المتضررة وإزالة التربة العلوية للتخلص منها. ويجب وضع خطة للاستجابة للانسكابات وتدريب جميع العمال على تنفيذها.				
	مراقبة نقل المركبات للمواد الخطرة				
	تنظيف الموقع بشكل دوري				
	ينبغي وضع علامة على كل وعاء بالاسم التقني الصحيح للمادة التي يحتوي عليها.				
	لا توضع المواد غير المتوافقة في حاويات مشتركة.				
	يخزن الوقود المستعمل أو نفايات الوقود أو غيرها من المواد الكيميائية للنفايات في منطقة معزولة إلى أن يتم جمعها للتخلص منها خارج الموقع من قبل مقاول نفايات معتمد.				
	ينبغي ألا يتم غسل المركبات والمعدات إلا في مناطق محددة بعيدا عن الطريق قيد الإصلاح لحماية نوعية المياه والتربة في المنطقة.				
	يوفر نظام جمع تحت أي آلات أو معدات قد تسرب الهيدروكربونات (مثل المولدات المتحركة).				
	مراقبة جميع العمليات التي تنطوي على استخدام الخرسانة لتجنب الرشح في مصادر المياه.				
	توفير صناديق في الموقع للتخلص من النفايات غير المتعلقة بالتشييد				
	العمل مع البلدية لإدراج موقع العمل الحالي على طريق جمع النفايات الصلبة				
	تقليل وقت تعرض التربة				
	تركيب الجدران الساندة قبل البدء بحفريات أفنية الصرف لمنع تآكل التربة				
	إجراء حفريات لقنوات الصرف بدقة تامة ونقل ناتج الحفر إلى خارج مواقع				

الآثار المحتملة	تدابير التخفيف المقترحة	مسؤولية التخفيف	مسؤولية الإشراف المباشر	التكلفة المقدرة
	<ul style="list-style-type: none"> □ العمل للتخلص منها على النحو السليم في حالة التلوث. □ تقليل الوقت الذي تظل قنوات الصرف المحفورة غير مدعومة به □ تفادي ازالة الغطاء النباتي لأدنى الحدود وتشجيع إعادة الغطاء النباتي فور انتهاء أنشطة البناء، في المواقع التي تتم فيها إزالة الغطاء النباتي، □ وضع أفخاخ من الجيونكسنايل لجمع الطمي حسب الاقتضاء 			
استهلاك الموارد	<ul style="list-style-type: none"> □ استبدال أساليب التنظيف الرطب بأساليب التنظيف الجاف كلما كان ذلك عملياً (كنس، شفط الغبار، مسح... الخ) ، مع الأخذ في الاعتبار حصر توليد الغبار. □ تركيب لافتات بالقرب من الأجهزة التي تستخدم المياه لتشجيع الحفاظ على المياه. □ استخدام الأغطية غير الراشحة لتغطية الخرسانة بعد رشها بالمياه للحفاظ على الرطوبة والحد من التبخر مما يؤدي إلى تقليل كميات المياه المستخدمة □ إيقاف محركات المعدات عندما لا تكون مستخدمة □ صيانة الآلات والمولدات بانتظام وتشغيلها بطريقة فعالة. □ لا تترك محركات المركبات شغالة لفترات طويلة و هي متوقفة. □ يجب عزل مكاتب الموقع بشكل جيد للاحتفاظ بالحرارة أو التبريد، والاستفادة من المصابيح الموفرة للطاقة وأنظمة التبريد الموفرة للطاقة. □ إعادة استخدام المواد الناتجة عن عمليات الحفر كلما كان ذلك ممكناً □ قبول مواد البناء فقط من مواقع المحاجر المسموح بها 	□ المقاول	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة والسلامة و البيئة بين مهام أخرى	مشمولة كجزء من أنشطة البناء والإشراف. مهندس المقاول في الموقع المسؤول عن الصحة والسلامة و البيئة من بين مهام مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة والسلامة و البيئة من بين مهام أخرى
البنى التحتية القائمة	<ul style="list-style-type: none"> □ الحصول على المخططات الأفقية والعمودية لكل طريق □ وضع إجراءات للإخطار السريع للبلدية/الوزارة المعنية، في حالة تعطل أي مرفق قائم، إلى جانب توفير المساعدة الفورية في إعادة الامور الى وضعها السابق، والمتابعة الحثيثة مع السلطات المعنية 	□ المقاول	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة والسلامة و البيئة بين مهام أخرى	مشمولة كجزء من أنشطة البناء والإشراف. مهندس المقاول في الموقع المسؤول عن الصحة والسلامة و البيئة من بين مهام مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة والسلامة و البيئة من بين مهام أخرى
التسلل البصري	<ul style="list-style-type: none"> □ توثيق الظروف القائمة قبل بدء الأعمال □ الحفاظ على الغطاء النباتي القائم عندما يكون ذلك ممكناً □ استعادة الغطاء النباتي المستهلك عن طريق إعادة الزراعة بالأشجار المتوطنة (الصنوبر والبلوط وما إلى ذلك) حيثما كان قطعها ضروريا أثناء البناء. □ إزالة جميع المعدات، أكوام المخلفات، وغيرها من المواد بعد البناء □ اختيار نوع الإنارة الأقل تسبباً في التلوث الضوئي □ التأكد من أن إنارة الشارع هي في الحد الأدنى من المطلوب. 	□ المقاول	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة والسلامة و البيئة بين مهام أخرى	مشمولة كجزء من أنشطة البناء والإشراف. مهندس المقاول في الموقع المسؤول عن الصحة والسلامة و البيئة من بين مهام مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة والسلامة و البيئة من بين مهام أخرى

التكلفة المقدرة	الإشراف	مسؤولية المباشر	مسؤولية التخفيف	تدابير التخفيف المقترحة	الآثار المحتملة
مشمولة كجزء من أنشطة البناء والإشراف. مهندس المقاول في الموقع المسؤول عن الصحة و السلامة و البيئة من بين مهام أخرى	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة بين مهام أخرى	مهندس الاستشاري في الموقع المسؤول عن الصحة و السلامة و البيئة من بين مهام أخرى	□ المقاول	<input type="checkbox"/> اتباع اللوائح القياسية للسلامة والصحة والبيئة في مجلس الانماء والاعمار والبنك الدولي <input type="checkbox"/> التأكد من أن مواقع البناء مغلقة بالكامل وحصر الدخول للعاملين على الموقع فقط <input type="checkbox"/> تحوير السير حول الموقع وتوفير ممرات للمشاة <input type="checkbox"/> تثبيت لافتات تحذير واضحة <input type="checkbox"/> توفير مساحة كافية للتحميل والتنزيل داخل الموقع نفسه <input type="checkbox"/> توفير معدات الحماية الشخصية المناسبة لعمال البناء، بما في ذلك الخوذات و أغطية الأذن) <input type="checkbox"/> توفير تجهيزات الإسعافات الأولية في الموقع تشمل الأشياء المناسبة (على سبيل المثال السائل المطهر والشاش والقطن وما إلى ذلك وغيرها من البنود اللازمة للتعامل مع أية جروح وكدمات) <input type="checkbox"/> توفير التأمين ضد الحوادث للعمال	الصحة والسلامة

الجدول ٣ : خطة التدابير التخفيفية البيئية لطرق قضاء البترون خلال مرحلة التشغيل

الآثار المحتملة	تدابير التخفيف المقترحة	مسؤولية التخفيف	مسؤولية الإشراف المباشر	التكلفة المقدرة
عرقلة حركة المرور و الازدحام	<input type="checkbox"/> صيانة البنية التحتية للسلامة على الطرق	<input type="checkbox"/> وزارة الأشغال العامة و النقل <input type="checkbox"/> البلديات	<input type="checkbox"/> البلديات	مدرجة كجزء من عقدي الأشغال والإشراف خلال السنة الواحدة من المسؤولية عن العيوب أثناء التشغيل.
الضوضاء	<input type="checkbox"/> توفير علامات الحد الأقصى للسرعة في المواقع الحرجة وفرض الحد الأقصى للسرعة <input type="checkbox"/> إضافة مواد امتصاص الضوضاء القائمة على الببتومين للأسطح على الأقسام المجاورة للمناطق السكنية والمستقبلات الحساسة مثل محمية أرز تنورين. <input type="checkbox"/> صيانة الطرق بانتظام	<input type="checkbox"/> وزارة الأشغال العامة و النقل <input type="checkbox"/> البلديات	<input type="checkbox"/> وزارة الأشغال العامة و النقل <input type="checkbox"/> البلديات	مدرجة كجزء من عقدي الأشغال والإشراف خلال السنة الواحدة من المسؤولية عن العيوب أثناء التشغيل.
التنوع البيولوجي	<input type="checkbox"/> نفس التدابير التخفيفية لمرحلة إعادة التأهيل <input type="checkbox"/> الحفاظ على مصدر الإنارة <input type="checkbox"/> صيانة مطبات السرعة واللافتات	<input type="checkbox"/> وزارة الأشغال العامة و النقل <input type="checkbox"/> البلديات	<input type="checkbox"/> وزارة الأشغال العامة و النقل <input type="checkbox"/> البلديات	مدرجة كجزء من عقدي الأشغال والإشراف خلال السنة الواحدة من المسؤولية عن العيوب أثناء التشغيل.
نوعية المياه والترربة	<input type="checkbox"/> الحفاظ على أنظمة تصريف المياه السطحية <input type="checkbox"/> يجب على المركبات التي تنقل المواد الخطرة إبلاغ الإدارات الإدارية ولا يمكنها الجري على الطريق ما لم تحصل على تصاريح. وبالإضافة إلى ذلك، ينبغي تزويد هذه المركبات بعلامات واضحة ولا يمكن إيقافها إلا في مواقع محددة	<input type="checkbox"/> وزارة الأشغال العامة و النقل <input type="checkbox"/> البلديات	<input type="checkbox"/> وزارة الأشغال العامة و النقل <input type="checkbox"/> البلديات	مدرجة كجزء من عقدي الأشغال والإشراف خلال السنة الواحدة من المسؤولية عن العيوب أثناء التشغيل.
استهلاك الموارد	<input type="checkbox"/> استخدام معدات ذات كفاءة في استخدام المياه أثناء عمليات الصيانة لتجنب الإفراط في استخدام المياه	<input type="checkbox"/> وزارة الأشغال العامة و النقل <input type="checkbox"/> البلديات	<input type="checkbox"/> وزارة الأشغال العامة و النقل <input type="checkbox"/> البلديات	مدرجة كجزء من عقدي الأشغال والإشراف خلال السنة الواحدة من المسؤولية عن العيوب أثناء التشغيل.
التسلل البصري	<input type="checkbox"/> ضمان إطفاء الأنوار بواسطة جهاز توقيت أو يدويًا عندما لا تكون هناك حاجة إليها.	<input type="checkbox"/> وزارة الأشغال العامة و النقل <input type="checkbox"/> البلديات	<input type="checkbox"/> وزارة الأشغال العامة و النقل <input type="checkbox"/> البلديات	مدرجة كجزء من عقدي الأشغال والإشراف خلال السنة الواحدة من المسؤولية عن العيوب أثناء التشغيل.
الصحة والسلامة	<input type="checkbox"/> اتباع لوائح السلامة والصحة والبيئة القياسية في مجلس الانماء و الاعمار والبنك الدولي أثناء أعمال الصيانة <input type="checkbox"/> إدارة الطرق المناسبة واللافتات والصيانة	<input type="checkbox"/> وزارة الأشغال العامة و النقل <input type="checkbox"/> البلديات	<input type="checkbox"/> وزارة الأشغال العامة و النقل <input type="checkbox"/> البلديات	مدرجة كجزء من عقدي الأشغال والإشراف خلال السنة الواحدة من المسؤولية عن العيوب أثناء التشغيل.

الجدول ٤ : خطة التدابير التخفيفية الاجتماعية لطرق قضاء البترون خلال مرحلة التاهيل

التكلفة المقدرة	الإشراف	مسؤولية المباشرة	المسؤولية	تدابير التخفيف المقترحة	الآثار المحتملة
مشمولة كجزء من أنشطة البناء والإشراف. مهندس المقاول في الموقع المسؤول عن الصحة والسلامة والبيئة من بين مهام أخرى مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة والسلامة والبيئة من بين مهام أخرى		مهندس الاستشاري في الموقع المسؤول عن الصحة والسلامة والبيئة بين مهام أخرى	المقاول مجلس الانماء و الاعمار البلديات	<input type="checkbox"/> إعلام الجمهور بجدول أنشطة البناء	الاقتصادية الاجتماعية
				<input type="checkbox"/> توفير إمكانية وصول بديلة إلى المساكن والشركات على جانب الطريق	
				<input type="checkbox"/> اعتماد خطط لإدارة حركة المرور لضمان حركة مرور آمنة وفعالة	
				<input type="checkbox"/> وضع معايير واضحة ونشرها عن التوظيف و تخصيص الوظائف ، مع مراعاة نسبة العمال من السوريين واللبنانيين في بيئة العمل، وفئات الوظائف والتخصصات المقتصرة على المواطنين اللبنانيين حصراً، والنظر أيضاً في حصص المجموعات الفرعية داخل المجتمعات المحلية.	
				<input type="checkbox"/> ضمان استيفاء متطلبات تصريح العمل وفقاً للوائح وزارة العمل	
				<input type="checkbox"/> الحفاظ على سجل العمل وسجل التحقق من السن للحماية من عمل الأطفال المحتمل	
				<input type="checkbox"/> ضمان عدم التمييز والمعاملة العادلة مثل المساواة في الأجور/الاستحقاقات وظروف العمل بين العمال	
				<input type="checkbox"/> إنشاء آلية تظلم فعالة للجمهور لتقديم شكاويهم. وينبغي أن تضمن الآلية وصول الشكاوى إلى الطراف المعنية، بمن فيهم المقاول، والاستشاري المشرف، والبلديات، ومجلس الانماء و الاعمار، والعمال.	
				<input type="checkbox"/> توفير خيار عدم الكشف عن الهوية بموجب آلية استعراض الانتهاكات للشكاوى الداخلية والخارجية على حد سواء.	
				<input type="checkbox"/> استمرار صلاحية بوالص التأمين التي تغطي جميع العمال في حالة الإصابة أو الحوادث أثناء تنفيذ الأشغال	

خطة الرصد

وبما أن المشروع هو من الفئة باء، فإن أنشطة الرصد لهذه المشاريع تعتمد في المقام الأول على الرصد البصري والتوثيق الفوتوغرافي على الرغم من أن قياسات بعض المؤشرات (تعدادات المرور، ونوعية الهواء/المياه، ومستوى الضوضاء) يمكن إجراؤها بناء على شكاوى الجمهور. ويتولى الاستشاري المشرف على المشروع مسؤولية أنشطة الرصد خلال مرحلة إعادة التأهيل لضمان تنفيذ المقاول لخطة التخفيف. وعند تقديم شكاوى من الجمهور، يمكن أيضاً تعيين طرف ثالث (استشاري) من قبل مجلس الإنماء و الأعمار لإجراء رصد دوري مع قياس للمؤشرات البيئية حسب طبيعة الشكاوى. ويقدم الجدول الخامس موجزاً لمؤشرات/أنشطة الرصد خلال مرحلة إعادة التأهيل.

وخلال مرحلة التشغيل، تصبح أنشطة الرصد المنتظمة بدرجة أكبر من واجبات ومسؤوليات البلديات المحلية وأصحاب المصلحة. وعلى غرار مرحلة إعادة التأهيل، يمكن أيضاً، عند تقديم الشكاوى من الجمهور، تعيين خبير استشاري من طرف ثالث من قبل مجلس الإنماء و الأعمار (حتى سنتين بعد إنجاز المشروع) لإجراء مراقبة دورية مع قياسات المؤشرات البيئية حسب طبيعة الشكاوى (الجدول ٦).

وخلال مرحلة إعادة التأهيل، يقدم الاستشاري المشرف تقريراً فصلياً عن أنشطة الرصد إلى مختلف أصحاب المصلحة بما في ذلك مجلس الإنماء و الأعمار والبلديات. وتكون هذه التقارير متاحة بسهولة أو يمكن أن يطلع عليها الجمهور عند تقديمها. وينبغي أن يعكس محتوى التقرير النموذجي مؤشرات خطة التخفيف معززا بوثائق فوتوغرافية ملائمة وإجراءات تتخذ في حالة وقوع حوادث أو ما يثير الاهتمام أو الشكاوى.

الجدول ٥ - خطة الرصد البيئي والاجتماعي لطرق قضاء البترون خلال مرحلة التأهيل

الأثر	أنشطة الرصد	المسؤولية	التردد/المدة	الموقع	الاساليب	التكلفة المقدرة ^١
حركه المرور	الإشراف المستمر مع توثيق التصوير الفوتوغرافي الدوري لتدابير التخفيف (الازدحام، تعطل حركة المرور، حدود السرعة، ساعات العمل، وجود شرطة المرور وعامل البناء في تحويرات السير)	الاستشاري المشرف	يومي	في موقع إعادة التأهيل	المراقبة البصرية والتوثيق الفوتوغرافي	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهامه الأخرى
جودة الهواء	الإشراف المستمر مع التوثيق الفوتوغرافي الدوري لتدابير التخفيف (انبعاثات المركبات وآليات الحفر، وإيقاف محركات المعدات غير المستخدمة، وصيانة المعدات، ونوع الوقود المستخدم في الموقع وفي شاحنات التزويد بالمواد، وحدود السرعة، ونظافة الموقع، ورش المياه، وظروف تخزين التربة ومواد البناء الدقيقة، وساعات العمل، وجدول نقل المواد	الاستشاري المشرف	يومي	في موقع إعادة التأهيل	المراقبة البصرية والتوثيق الفوتوغرافي	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهامه الأخرى
	مجموع الجسيمات المعلقة TSP ، PM10، (حيثما كان ذلك ممكنا)، أكاسيد الكبريت، أكاسيد النيتروجين و أول أكسيد الكربون	استشاري طرف ثالث لمجلس الإنماء والإعمار	بناء على شكوى من الجمهور	في الموقع وفي المستقبلات الحساسة ضمن مسافة ١٠٠ متر من الموقع	قياسات لساعة واحدة والمراقبة البصرية لتشتت الغبار (الحجم والاتجاه)	٢٠٠٠ دولار لكل مرة
-الضوضاء	الإشراف المستمر مع التوثيق الفوتوغرافي الدوري لتدابير التخفيف (كاتواتم الصوت، وصيانة المعدات، وإيقاف تشغيل محركات المعدات عند عدم استخدامها، وحدود السرعة، وساعات العمل) وقياسات المؤشرات في حالة الشكاوى من الجمهور	الاستشاري المشرف	يومي	في موقع إعادة التأهيل	المراقبة البصرية والتوثيق الفوتوغرافي	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهامه الأخرى
	L _{eq} , L _{min} and L _{max}	مستشار طرف ثالث لمجلس الإنماء والإعمار	بناء على شكوى من الجمهور	في الموقع وفي المستقبلات الحساسة ضمن نطاق ١٠٠ متر من الموقع	عينة واحدة لكل موقع (قراءة كل ساعة واحدة لمدة ١٥ دقيقة على المعدل ، صباحا (٧-٨ صباحا) و (١-٢ ب.ظ) وليلا (٤-٥ مساءً)	٥٠٠ دولار/ حدث
التنوع البيولوجي	الإشراف المستمر مع التوثيق الفوتوغرافي الدوري لتدابير التخفيف، حركة العمال ونشاطهم، والتخلص من النفايات، وما إلى ذلك	الاستشاري المشرف	يومي	في موقع إعادة التأهيل	المراقبة البصرية والتوثيق الفوتوغرافي	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهامه الأخرى
النفايات الصلبة من الأشغال و	الإشراف المستمر مع التوثيق الفوتوغرافي الدوري لتدابير التخفيف مع الاحتفاظ بسجل لتوليد النفايات	الاستشاري المشرف	يومي	في موقع إعادة التأهيل	المراقبة البصرية والتوثيق الفوتوغرافي	مهندس الاستشاري في الموقع المسؤول عن الإشراف على

غيرها	وجمعها وعزلها وتخزينها ونقلها والتخلص منها من حيث نوع النفايات المتولدة وكميتها وموقع التخلص منها					الصحة و السلامة و البيئة من بين مهامه الأخرى
مياه الجريان السطحي/ تصريف المياه	الإشراف المستمر مع الوثائق الفوتوغرافية الدورية (الاستخدام الكيميائي، تخزين المواد الكيميائية، واستخدام المياه، وصناديق للتخلص من النفايات الصلبة، وتصريف مياه الصرف الصحي من المراحيض المتنقلة / المحمولة وخزانات التخزين في شبكة الصرف الصحي القائمة / القريبة. إدارة الانسكابات النفطية) أثناء التحقق من العبارات وخاصة بعد هطول الأمطار	الاستشاري المشرف المقاول	يومي	في موقع إعادة التأهيل	المراقبة البصرية والفوتوغرافي والتوثيق	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهامه الأخرى
تحليل جودة المياه	مستشار طرف ثالث مجلس الإنماء والإعمار	بناء على شكوى الجمهور	في النهر أو مجرى المياه القريب	مجموع المواد الصلبة المعلقة، BOD، COD، الزيوت / الشحوم	١٠٠٠ دولار / حدث	
استهلاك الموارد	الإشراف المستمر مع التوثيق الفوتوغرافي الدوري لإعادة استخدام المواد المحفورة والمياه وممارسات حفظ الطاقة وعناصر التصميم	الاستشاري المشرف	يومي	في موقع إعادة التأهيل	المراقبة البصرية والفوتوغرافي والتوثيق	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهامه الأخرى
البنية التحتية القائمة	الإشراف المستمر مع التوثيق الفوتوغرافي الدوري للتنقيب والاستجابة لتعطيل المرافق تحت الأرض	الإشراف مشرف	يومي	في موقع إعادة التأهيل	المراقبة البصرية والفوتوغرافي والتوثيق	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهامه الأخرى
التسلل البصري	الإشراف المستمر مع التوثيق الفوتوغرافي الدوري للتنقيب وإعادة الزراعة / إعادة الغطاء النباتي أثناء التحقق من المجاري خاصة بعد أحداث هطول الأمطار	الإشراف مشرف	يومي	في موقع إعادة التأهيل	المراقبة البصرية والفوتوغرافي والتوثيق	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهامه الأخرى
الصحة والسلامة	الإشراف المستمر مع وثائق التصوير الدوري (PPE)، نطاق الموقع، المناطق العازلة، علامات التحذير، مجموعة الإسعافات الأولية، والتأمين ضد الحوادث)، مع الحفاظ على سجل من الإصابات / الحوادث التي تحدد السبب والموقع	الإشراف مستشار بلديه	يومي	في موقع إعادة التأهيل	المراقبة البصرية والفوتوغرافي والتوثيق	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهامه الأخرى
الاجتماعية والاقتصادية	الإشراف المستمر مع التوثيق الفوتوغرافي الدوري لتدابير التخفيف مع الحفاظ على سجل التوظيف والنظم ، وإتاحة برنامج العمل لاطلاع الجمهور ، وتأمين الوصول إلى المؤسسات والمساكن على جانب	الإشراف مشرف	يومي	في موقع إعادة التأهيل	المراقبة البصرية والفوتوغرافي والتوثيق	مهندس الاستشاري في الموقع المسؤول عن الإشراف على الصحة و السلامة و البيئة من بين مهامه الأخرى

الطريق ، وسجل المظالم. توثيق التدريب والتوعية بـ
"التقييم البيئي الاستراتيجي/الصحة" وتوقيع مدونة
قواعد السلوك وكذلك سجل التحقق من السن منعا
لتشغيل الأطفال.

الجدول ٦ : خطة الرصد البيئي والاجتماعي لطرق قضاء البترون خلال مرحلة التشغيل (حتى سنة بعد استكمال تنفيذ المشروع)

التردد/	المسؤولية	المدة	الموقع	الاساليب	التكلفة المقدرة	الانثر	أنشطة الرصد
	طرف ثالث مستشار	بناء على شكوى من الجمهور	في الموقع وفي المستقبلات الحساسة ضمن مسافة ١٠٠ متر من الموقع	قياسات ساعة واحدة والمراقبة البصرية لتشتت الغبار (الحجم والاتجاه)	٢٠٠٠ دولار/حدث	جودة الهواء	مجموع الجسيمات المعلقة TSP ، PM10 ، PM2.5 (حيثما كان ذلك ممكناً)، أكاسيد الكبريت، أكاسيد النيتروجين و أول أكسيد الكربون
	طرف ثالث مستشار	بناء على شكوى من الجمهور	في الموقع وفي المستقبلات الحساسة ضمن مسافة ١٠٠ متر من الموقع	عينة واحدة لكل موقع (قراءة كل ساعة واحدة لمدة ١٥ دقيقة على المعدل ، صباحا (٧-٨ صباحا) و (١-٢ ب.ظ) وليلاً (٤-٥ مساءً)	٥٠٠ دولار/حدث	الضوضاء	L _{eq} , L _{min} and L _{max}
	طرف ثالث مستشار	بناء على شكوى من الجمهور	في النهر و مجرى المياه القريب	فحص تحليلي لعينة واحدة	١٠٠٠ دولار / حدث	المياه	مجموع المواد الصلبة المعلقة، BOD ، COD ، الزيوت والشحوم

مشاورة وإبلاغ العامة والية مراجعة الشكاوى

مشاورة العامة

عقد اجتماع تشاوري مع الجمهور بتاريخ ٢٠١٩/١٢/٢٠ مع اتحاد بلديات قضاء البترون عرضت خلاله خطة الادارة البيئية الاجتماعية (انظر الملحق دال للتقرير الأساسي). وحضر الاجتماع ٣٤ شخصاً من بينهم ٢٠ رئيساً لبلديات في قضاء البترون و٨ نساء. وأثيرت عدة مسائل خلال الاجتماع مع الاتحاد مثل:

□ يتم تمويل هذا المشروع من خلال قرض وليس منحة. وكان ينبغي استخدام الأموال لهذا القرض في المشاريع الأكثر حيوية من إصلاح الطرق.

□ وشكا الكثيرون من أنهم لم يكونوا على علم بهذا المشروع حتى الآن. وأوضح أن المشروع نوقش مع رؤساء البلديات المنتهية ولايتهم قبل الانتخابات البلدية الأخيرة.

□ المعايير المطبقة لاختيار الطرق التي ستخضع للتأهيل ليست واضحة وشفافة. ويبدو أن الاعتبارات السياسية لعبت دوراً هاماً، حيث أن هناك طرقاً تحتاج إلى إعادة تأهيل أكثر من الطرق المقترحة. وتم الاتفاق على أن تقوم البلديات، عن طريق الاتحاد، بإعداد قائمة بالطرق الإضافية التي تحتاج إلى إعادة تأهيل، وستقدم القائمة إلى مجلس الانماء و الاعمار لأخذها بالاعتبار في المرحلة الثانية من المشروع.

□ تمت مناقشة فرص العمل لكل من العمال اللبنانيين والسوريين. والسوريون يساهمون بشكل كبير في قطاع البناء في جميع أنحاء لبنان بما في ذلك قضاء البترون. وإلى جانب القطاع الخاص، تلجأ البلديات إلى العمالة السورية في هذا القطاع على وجه الخصوص. ويبدو أن هناك تقاسماً واضحاً في أنواع الوظائف بين المجتمعات المحلية. والخط الفاصل بين الوظائف الماهرة (التي تشغلها أساساً القوى العاملة اللبنانية) والعمالة غير الماهرة (التي يشغلها في المقام الأول العمال السوريون). وقد أدى هذا التقاسم إلى احتواء التوترات و الحد من الصراعات المحتملة بين الطرفين.

□ هناك بعض أقسام الطرق المقترحة كانت قد خضعت مؤخراً لأعمال إعادة التأهيل. وهل يمكن تحويل الميزانية المخصصة لها إلى أعمال إضافية على طول تلك الطرق؟

□ ترغب البلديات المعنية الاطلاع على خرائط تصميم الطرق لتقديم رأيها حول عناصر إعادة التأهيل المقترحة. واتفق على إمكانية استيعاب ذلك في اجتماعات لاحقة بناء على طلب الاتحاد مع مهندس الاستشاري ومع المقاول قبل الشروع في أنشطة التشييد.

□ هناك مراسيم استملاك في وزارة الأشغال العامة والنقل للطرق المختارة. وينبغي أن تؤخذ هذه في الاعتبار عند إعادة تأهيل الطرق، ولا سيما فيما يتعلق بعرض الطريق لأن الرصف الحالي قد لا يكون

في كثير من المواقع على كامل عرض للطريق.

كذلك عقد اجتماع منفصل مع النسوة اللواتي حضرن الاجتماع للوقوف على شواغلهن. وقد شددن على ما يلي:

□ اشتكين من الشروع في التنفيذ ثم البطء فيه حتى أحيانا عدم إكماله على الإطلاق، أو تجاوز المهلة المحددة، وبالتالي طالبن تجنب إطالة أمد الإزعاج للجمهور.

□ يجب احترام هواجس الجمهور أثناء تنفيذ المشروع.

□ استخدام مواد البناء ذات النوعية الجيدة التي لا تتدهور بسرعة، وفقا للمواصفات المتفق عليها.

□ تجنب تدمير عناصر الطرق القائمة مثل اللافتات التي هي في حالة جيدة التي تم تركيبها من خلال مبادرات خاصة. ويوصى بالاحتفاظ بالعناصر القائمة واستخدام الفائض في التمويل لإضافة عناصر أخرى على طول الطرق.

□ زراعة الأشجار على طول الطرق المعاد تأهيلها لتنسيق مواقع الدورات.

□ تشجيع البلديات على الإشراف المباشر على الأشغال، لضمان أنها على مستوى المعايير المتفق عليها.

□ تقديم الخرائط التصميمية إلى قسم الهندسة في اتحاد بلديات قضاء البترون لإبداء رأيهم الفني.

□ التأكيد على المقاول لتشغيل المحليين من سكان القرى التي تجري في نطاقاتها إعادة تأهيل الطرق.

وبالإضافة إلى ذلك، تم الاتصال بالعديد من المنظمات غير الحكومية المحلية وأصحاب المصلحة (الذين يعملون على مستوى لبنان بأكمله) للحصول على مساهماتهم حول معرفتهم وخبرتهم مع القوى العاملة السورية محلياً وفي لبنان. واستناداً إلى هذه المحادثات، من الواضح أن العمال السوريين موجودون في منطقة المشروع ويتم الاعتماد عليهم عادة لا سيما في قطاعي البناء والزراعة. وعملية توظيفهم غامضة بعض الشيء لأنها نادراً ما تحصل على تصريح عمل صادر عن وزارة العمل أو حتى أن تتقدم بطلب للحصول عليه. ولذلك، فإنها تشكل قوة عاملة مؤقتة يتم توظيفها في مشاريع محددة وتعويضها نقداً. ونادراً ما تقدم لهم مزايا منتظمة مرتبطة بهذه العمالة على الرغم من أن مقاولي البناء ملزمون عادة بحمل تأمين عام على السلامة يشمل جميع العمال في الموقع في حالة وقوع حوادث أو إصابات. إن شرعية عمل العامل السوري فيما يتعلق بالقانون اللبناني تزيد من غموض عملية التوظيف. عادة، يجب على أي عامل أو موظف أجنبي في لبنان الحصول على تصريح عمل من وزارة العمل تليها إقامة صادرة عن مكتب الأمن العام اللبناني التابع لوزارة الداخلية. تاريخياً، كان يُسمح للعمالة السورية بدخول لبنان والعمل في الغالب في

قطاعي البناء والزراعة دون تصريح عمل أو إقامة. في السنوات الأخيرة، عندما أصبح اللاجئون السوريون جزءاً من هذه القوى العاملة وخارجها، أصدرت وزارة العمل قراراً بالسماح للسوريين بالعمل فقط بتصريح عمل نادراً ما يحصل عليه المقاولون لصالح عمالهم السوريين المؤقتين لأن وزارة الداخلية لا تنفذ القرار الوزاري بعد وعملية تصريح العمل- الإقامة تزيد التكلفة على المقاول.

ومن المقترح إنشاء آلية لمراجعة الشكاوى لتمكين أصحاب المصلحة الداخليين والخارجيين من التعبير عن شواغلهم خلال مراحل المشروع: ما قبل البناء، وخلال تنفيذ الأشغال، و خلال التشغيل. وتهدف هذه الآلية المقترحة السماح بحل الإشكالات في الوقت المناسب، مع طمأنة أصحاب المصلحة إلى أن الشكاوى قد سُمعت على مختلف المستويات وأن الآلية المؤسسية ستسفر عن نتيجة عادلة ونزيهة. وعلاوة على ذلك، تنطبق آلية مراجعة الشكاوى على العمال اللبنانيين والسوريين على حد سواء، بحيث يكون لديهم خيار عدم الكشف عن هويتهم عند تقديم الشكاوى لتشجيع العمال على التعبير عن آرائهم دون خوف محتمل من العواقب.

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	II
TABLE OF CONTENTS	XL
LIST OF TABLES.....	XLIII
LIST OF FIGURES.....	XLIV
LIST OF ABBREVIATIONS	XLV
LIST OF NOMENCLATURES.....	XLVI
1 INTRODUCTION.....	1
1.1 Project background.....	1
1.2 Project Rationale	2
1.3 Report Objectives	2
1.4 Methodology.....	3
1.5 ESMP Report Structure	3
2 LEGAL, INSTITUTIONAL, STANDARDS AND POLICIES FRAMEWORKS	5
2.1 Legal Framework.....	5
2.2 Institutional.....	7
2.3 Environmental Standards.....	Error! Bookmark not defined.
2.3.1 Air quality.....	10
2.3.2 Noise levels.....	10
2.3.3 Wastewater discharge	12
2.3.4 Gap analysis for national environmental standards.....	14
2.4 World Bank Policies.....	Error! Bookmark not defined.
2.4.1 Public disclosure policy	Error! Bookmark not defined.
2.4.2 Useful policies and guidelines.....	Error! Bookmark not defined.
2.5 International treaties and conventions	14
3 PROJECT DESCRIPTION	17
3.1 Location.....	17
3.2 Project activities	24
3.3 Material and Equipment	26
3.4 Site facilities	26
4 BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS.....	28
4.1 Physical environment	28
4.1.1 Topography	28
4.1.2 Geology	34
4.1.3 Hydrology.....	40
4.1.4 Climate and meteorology	43
4.1.5 Ambient air quality and noise levels.....	45
4.1.6 Land use land cover.....	47

4.2	Biological Environment.....	53
4.2.1	<i>Flora</i>	53
4.2.2	<i>Fauna</i>	53
4.2.3	<i>Ecologically Sensitive Areas</i>	53
4.3	Socioeconomic Environment.....	54
4.3.1	<i>Demographic Profile</i>	54
4.3.2	<i>Social Activities</i>	55
4.3.3	<i>Economic Activities</i>	55
5	POTENTIAL ENVIRONMENTAL & SOCIAL IMPACTS	60
5.1	Assessment methodology	60
5.2	Potential positive impacts during rehabilitation	62
5.3	Potential adverse impacts during the rehabilitation phase.....	62
5.3.1	<i>Traffic</i>	62
5.3.2	<i>Air quality</i>	63
5.3.3	<i>Noise</i>	63
5.3.4	<i>Biodiversity</i>	64
5.3.5	<i>Construction waste</i>	65
5.3.6	<i>Water and soil quality</i>	65
5.3.7	<i>Resources consumption</i>	65
5.3.8	<i>Existing infrastructure</i>	67
5.3.9	<i>Landscape and visual intrusion</i>	67
5.4	Potential Socio-economic impacts.....	67
5.4.1	<i>Social tensions</i>	67
5.4.2	<i>Child labor</i>	67
5.4.3	<i>Labor influx</i>	68
5.4.4	<i>Access to services</i>	68
5.4.5	<i>Health and safety impacts</i>	68
5.4.6	<i>Traffic disturbance</i>	69
5.5	Potential positive impacts during the operation phase	69
5.5.1	<i>Traffic and air quality</i>	69
5.5.2	<i>Landscape and visual intrusion</i>	69
5.5.3	<i>Health and safety impacts</i>	69
5.5.4	<i>Socio-economics</i>	69
5.6	Potential negative impacts during the operation phase.....	70
5.6.1	<i>Air quality</i>	70
5.6.2	<i>Noise</i>	70
5.6.3	<i>Biodiversity</i>	71
5.6.4	<i>Water and soil quality</i>	71
5.6.5	<i>Resources Consumption</i>	72
5.6.6	<i>Visual amenity</i>	72
5.6.7	<i>Health and safety impacts</i>	72
5.7	Summary of environmental impact analysis.....	72
5.8	Summary of socio-economic impact assessment	73
6	MITIGATION OF ENVIRONMENTAL AND SOCIAL IMPACTS	74
6.1	Environmental Mitigation Measures during Rehabilitation	74
6.1.1	<i>Traffic</i>	74

6.1.2	<i>Air quality</i>	77
6.1.3	<i>Noise levels</i>	77
6.1.4	<i>Biodiversity</i>	77
6.1.5	<i>Construction waste</i>	78
6.1.6	<i>Water and soil quality</i>	78
6.1.7	<i>Resources consumption</i>	80
6.1.8	<i>Existing infrastructure</i>	80
6.1.9	<i>Visual intrusion</i>	80
6.2	Environmental Mitigation Measures during Operation	81
6.2.1	<i>Air quality</i>	81
6.2.2	<i>Noise levels</i>	81
6.2.3	<i>Biodiversity</i>	81
6.2.4	<i>Water and soil quality</i>	81
6.2.5	<i>Resource consumption</i>	81
6.2.6	<i>Visual intrusion</i>	81
6.2.7	<i>Health and safety</i>	82
6.3	Socio-economic Mitigation Measures During Rehabilitation	82
6.3.1	<i>Social tensions</i>	82
6.3.2	<i>Child labor</i>	83
6.3.3	<i>Labor influx</i>	83
6.3.4	<i>Access to services</i>	83
6.3.5	<i>Health and safety impacts</i>	83
6.3.6	<i>Traffic disturbance</i>	84
6.4	Social Mitigation Measures During Operation	84
7	ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN	85
7.1	Institutional Setup and Capacity Building	85
7.1.1	<i>National Institutions</i>	85
7.1.2	<i>Training</i>	86
7.1.3	<i>Reporting</i>	87
7.2	Mitigation Plans	87
7.2.1	<i>Environmental Mitigation Plan</i>	88
7.2.2	<i>Social Mitigation Plan</i>	97
7.3	Monitoring Plan	97
7.3.1	<i>Monitoring Plan Implementation</i>	97
7.3.2	<i>Documentation and Reporting</i>	103
7.3.3	<i>Guidelines for Health and Safety Plan during rehabilitation</i>	103
8	CONSULTATION, DISCLOSURE AND GRIEVANCE REDRESS MECHANISM	104
8.1	Public Consultation	104
8.2	Grievance Redress Mechanism	108
9	CONCLUSION	113
10	REFERENCES	114
	ANNEXES	115

LIST OF TABLES

Table	Page
Table 2-1. List of selected legislation relevant to the Project	5
Table 2-2. Summary of functional responsibilities of transport/traffic involved ministries/agencies	7
Table 2-3. Maximum allowable ambient air quality concentrations as per MOE Decision 1/52	10
Table 2-4. Lebanese noise guidelines in different zones as per MOE Decision 1/52	10
Table 2-5. Summary of FHWA noise abatement criteria	11
Table 2-6. Limit values for wastewater discharged into surface water as per MOE Decision 8/1	Error!
Bookmark not defined.	
Table 2-7. Limit values for wastewater discharged into the sewage network as per MOE Decision 8/1	13
Table 2-8. Comparison of national ambient air quality standards to WHO guidelines	14
Table 2-9. International laws and conventions signed by Lebanon	Error! Bookmark not defined.
Table 3-1. Location and characteristics of Batroun district proposed roads	19
Table 3-2. Design elements along proposed Batroun district roads with estimated construction material	25
Table 4-1. Main lithology and formations crossed by proposed roads	35
Table 4-2. Average annual ambient concentrations of air pollutants in the Batroun district	46
Table 4-3. Main land use land cover areas along proposed roads in the Batroun district (within 50 meters)	49
Table 4-4. Traffic indicators for Batroun district proposed roads	59
Table 5-1. Consequence scores	61
Table 5-2. Significance categories based on consequence-likelihood interaction	62
Table 5-3. Estimated quantities of construction material based on the preliminary engineering design	66
Table 5-4. Average energy consumption for total asphalt construction per road	66
Table 5-5. Projected traffic volume along the Batroun district proposed roads (20 years)	70
Table 5-6. Summary of potential impacts of proposed roads in Batroun district	73
Table 7-1. Environmental Mitigation Plan for the Batroun district roads during the rehabilitation phase	89
Table 7-2. Environmental Mitigation Plan for the Batroun district roads during the operation phase	95
Table 7-3. Social Mitigation Plan for the Batroun district roads during the rehabilitation phase	97
Table 7-4. Environmental and Social Monitoring Plan for the Batroun district roads during the rehabilitation phase	99
Table 7-5. Environmental and Social Monitoring Plan for the Batroun district roads during the operation phase (up to one year after project completion)	102
Table 8-1. Contacts with local NGOs and stakeholders	108

LIST OF FIGURES

Figure	Page
Figure 3-1. Location overview and elevation of proposed roads within Batroun district	18
Figure 3-2. Road alignment of Batroun Road 4 (Hourata - Harisa) with contour elevations	20
Figure 3-3. Road alignment of Batroun Road 5 (Bassatin Al Ossi – Beit Chelala) with contour elevations.....	21
Figure 3-4. Road alignment of Batroun Road 6 (Kour-Zan-Assia) with contour elevations	22
Figure 3-5. Road alignment of Batroun Road 7N (Bassatin Al Ossi- Kfour Al Arabi) with contour elevations..	23
Figure 4-1. Contour maps for the four proposed roads.....	29
Figure 4-2. Relatively gentle slopes along Road 7N (Bassateen Al Ossi- Kfour Al Arabi)	33
Figure 4-3. Relatively flat terrain at the valley along Road 5 (Bassaten Al Ossi – Kfar Helda- Beit Chelala)	33
Figure 4-4. Geological map of the Batroun area, north Lebanon	34
Figure 4-5. Lithology of the Batroun district and along proposed roads	36
Figure 4-6. Faults and erosion risk in the Batroun district.....	38
Figure 4-7. Landslides, rockfall sites, and earthflows	39
Figure 4-8. Hydrology and water resources surrounding proposed roads in the Batroun district.....	41
Figure 4-9. Bridge at the intersection of Road 5 (Bassaten Al Ossi – Beit Chelala) and Al Jaouz River.....	42
Figure 4-10. Al Jaouz River passing at intersecting Road 5 (Bassaten Al Ossi – Beit Chelala)	42
Figure 4-11. (a) Lebanon geoclimatic regions, (b) rain gauges locations, (c) temperature stations locations	43
Figure 4-12. Average monthly rainfall values for Batroun district (1901-2015) at location (34.2,35.91).....	44
Figure 4-13. Average monthly temperature values for Batroun district (1901-2015) at location (34.2,35.91)	44
Figure 4-14. Wind speed and wind direction from the Bcharre weather station for the year 2018	45
Figure 4-15. Air quality cells as per the JICA (2018).....	46
Figure 4-16. Land use and land cover map of selected roads at Batroun Caza	48
Figure 4-17. Canes and olive trees along Road 5 (Bassaten Al Ossi - Beit Chelala) in Kfar Helda.....	50
Figure 4-18. Vegetation (pine trees) at Road 7N (Bassateen Al Ossi Kfour Al Arabi)	51
Figure 4-19. Olive trees on the side of Road 7N (Bassateen Al Ossi Kfour Al Arabi)	51
Figure 4-20. Varying vegetative cover along Road 6 (Kour Zan Asia).....	52
Figure 4-21. Proximity of Road 4 (Hourata Harisa) to Tannourine nature reserve	54
Figure 4-22. Bcharre – Tannourine Road at Road 4 (Hourata Harisa), with very few shops and residences	56
Figure 4-23. Agricultural and residential nature near Road 5 (Bassaten Al Ossi Kfar Helda Beit Chelala)	57
Figure 4-24. Kfour El Arabi village at the end of Road 7N (Bassateen Al Ossi Kfour Al Arabi).....	58
Figure 4-25. Residential, commercial, and religious buildings along Road 6 (Kour-Zan-Assia)	58
Figure 6-1. Traffic management plan for a detour along a 2-lane 2-way single road.....	75
Figure 6-2. Traffic management plan for a detour along a dual carriageway road.....	76
Figure 7-1. Institutional setup for project implementation	86
Figure 8-1. Public participation session with Batroun district stakeholders	104
Figure 8-2. Typical grievance redress mechanism for the REP	111

LIST OF ABBREVIATIONS

AREC	American University of Beirut Advancing Research Enabling Communities Center
AUB	American University of Beirut
CDR	Council for Development and Reconstruction
DoA	Department of Antiquities
EA	Environmental Assessment
EIA	Environmental Impact Assessment
ESC	Environmental and Social Consideration
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FI	Financial Intermediary
GIS	Geographic Information Systems
GOL	Government of Lebanon
GRM	Grievance Redress Mechanism
IBA	Important Bird Area
IEE	Initial Environmental Examination
LARI	Lebanese Agricultural Research Institute
MoA	Ministry of Agriculture
MoC	Ministry of Culture
MoE	Ministry of Environment
MoEW	Ministry of Energy and Water
MoIM	Ministry of Interior and Municipalities
MoL	Ministry of Labor
MoPWT	Ministry of Public Works and Transport
MSL	Mean Sea Level
NGO	Non-Governmental Organization
OP	Operational Policy
PIU	Project Implementation Unit
REP	Lebanon Roads and Employment Project
WB	World Bank

LIST OF NOMENCLATURES

%	Percent
µg	Microgram
g	Gram
kg	Kilograms
km	Kilometers
Leq	Average equivalent noise levels
Lmin	Minimum noise level
Lmax	Maximum noise level
MJ	Mega Joules
min	Minutes
mm	millimeter
hr	Hour
ha	Hectare
m ²	Square meter
m ³	Cubic meter
ppm	Parts per million
s	Seconds

1 INTRODUCTION

1.1 Project background

The Government of Lebanon (GOL) has solicited and obtained World Bank (WB) financing for the Roads and Employment Project (REP). The Council for Development and Reconstruction (CDR) is acting as the executing agency on behalf of the GOL and its Council of Ministers (COM). The REP seeks to improve transport connectivity along select paved road sections and create short term employment opportunities for local communities. These road sections were categorized into six lots (1, 2, 3, 4, 5, and 6), with each lot covering several cazas² and each caza encompassing at least one road or more.

The REP involves rehabilitation activities that are confined within the alignments of existing roads with no road widening. However, the REP triggered the World Bank Operational Policy OP 4.01 requiring Environmental and Social assessment. As such, an Environmental and Social Management Framework (ESMF) was prepared for the REP through CDR with support from the WB (CDR, 2018). The ESMF concluded that the REP activities are not expected to have significant environmental impacts and classified the REP under WB category B projects that require the preparation of an Environmental and Social Management Plan (ESMP) that is normally not associated with further screening or scoping studies for the various roads under consideration. Besides no significant environmental impacts, the ESMF equally anticipated no impacts on physical and cultural resources or natural habitats, no involuntary resettlement, and no land acquisition. Accordingly, a series of ESMPs were stipulated to be prepared at the caza level and put together in packages for bidding purposes. In this context, CDR awarded the contract number 20379 to TEAM International, hereinafter referred to as the Consultant, to prepare the assessment, design and ESMPs of Lot 5 encompassing the of Cazas of Batroun, Bcharre, Koura and Tripoli and Lot 6 encompassing the Cazas of Baalbeck and Hermel under the REP.

This ESMP is concerned with the following roads within the Batroun district (Caza) of the North Lebanon governorate (Mohafazah).

- Road 4: Hourata-Harisa
- Road 5: Bassaten Al Ossi – Kfar Helda- Beit Chelala

² The Lebanese territory is administratively divided into eight governorates (mouhafazah). These governorates are further divided administratively into 25 districts (cazas). The cazas are further divided into municipalities. Two or more municipalities can form a federation of municipalities. The project covers selected roads in the 25 cazas throughout Lebanon with an expected total length of 835 km grouped in the six lots.

- Road 6: Kour, Zan, and Assia
- Roads 7N: Bassateen Al Ossi- Kfour Al Arabi

Refer to Chapter 3- Project Description for details on these roads.

1.2 Project Rationale

The ESMF (CDR, 2018) provided the main rationale behind the REP by elaborating about Lebanon's largely adequate extent and coverage of the road network, but with a substantial percentage in poor condition, hindering local and economic development particularly in rural and lagging underserved regions where the condition of the main network is worse than the national average. The ESMF attributed these poor conditions to several factors including years of underinvestment, inefficient spending, weak capacity in road agencies and the absence of asset management tools. The ESMF stressed that this situation was aggravated by the influx of Syrian refugees which has substantially increased traffic demand and the utilization of the road network. Hence, the general objectives of the REP are to improve transport connectivity along select paved road sections and create short term jobs for Lebanese and Syrians through specific components that encompass rehabilitation and maintenance, improvement of emergency response capacity, and capacity building and implementation support.

1.3 Report Objectives

Pursuant to the World Bank OP 4.01 (Environmental Assessment), this ESMP report seeks to satisfy the following objectives:

- Providing a sound basis for decision-making about the design of the Project components that takes environmental and social considerations into account.
- Ensuring that the Project is implemented with full awareness of environmental and social factors.
- Developing the ESMP for the rehabilitation and operation phases of the Project,
- Informing the public when and how the project implementation may affect their environment, and
- Facilitating the public participation in the decision-making process.

More specifically, the report aims to:

- Establish environmental and socio-economic baseline
- Set the legal, institutional, standards & policies frameworks
- Identify the responsible authorities and assign roles for different organizations in the efficient implementation of this ESMP.

It is worth mentioning here that Decree No. 8633/2012 about Fundamentals of Environmental Impact Assessment (EIA) is not relevant to the Project since this latter is not categorized under either Annex I or II of the EIA Decree.

1.4 Methodology

In order to achieve the ESMP objectives outlined above, we have reviewed relevant project designs and studies particularly the ESMF prepared for the project In addition, we:

- ❑ Examined the national legislation and World Bank safeguard policies relevant to the project
- ❑ Conducted field visits in 2019 to observe and document baseline conditions and collected data from the relevant municipalities
- ❑ Reviewed relevant literature including the project ESMF
- ❑ Synthesized and processed information related to coverage using the geographic information systems (ArcGIS Desktop Version 10.61 by ESRI, License type: Advanced) to prepare baseline maps
- ❑ Assessed environmental and social impacts associated with the project at various stages of the project using factors such as health and safety as well as the natural environment
- ❑ Wherever relevant, defined mitigation measures to alleviate or reduce potential adverse impacts
- ❑ Developed a monitoring plan with emphasis on the rehabilitation phase when impacts are expected with estimated implementation resources
- ❑ Documented public consultation and opinions with potentially affected stakeholders for this site-specific ESMP
- ❑ Development of grievance redress mechanisms (GRM) for the project

Note that since the project is category B under the World Bank guidelines, no field measurements of environmental indicators were anticipated (i.e. traffic, air quality, noise levels, water quality) under this contract. Instead, we relied on data from existing studies wherever available. We equally used a worst case condition approach that would form an envelope of the maximum possible impact which when judged to be minor or moderate reflect an acceptable project impact. Details of such an approach are outlined when assessing a specific indicator below (i.e. air quality and noise).

1.5 ESMP Report Structure

Besides the above introductory Chapter, the scope of work implemented in the preparation of the ESMP includes the following:

- ❑ Definition of the existing legal and administrative framework (Chapter 2)
- ❑ Description of the proposed project (Chapter 3)
- ❑ Definition of baseline environmental and social conditions (Chapter 4)
- ❑ Identification of potential environmental and social impacts (Chapter 5)
- ❑ Identification of environmental and social mitigation measures (Chapter 6)
- ❑ Development of the environmental and social mitigation and monitoring plan (Chapter 7)
- ❑ Soliciting public participation including grievance redress mechanisms (Chapter 8)

2 LEGAL, INSTITUTIONAL, STANDARDS AND POLICIES FRAMEWORKS

2.1 Legal Framework

Several laws, decrees, and decisions in Lebanon define the environmental standards and regulations to be met while implementing projects. The most basic and general law is Law No. 444 (Environment Protection Law) dated 8 August 2002. Table 2-1 presents a list of selected legislation relevant to the Project.

Table 2-1. List of selected legislation relevant to the Project

<i>Legislation³</i>	<i>Date of Issue</i>	<i>Subject</i>	<i>Relevance to the project</i>
<i>Environment-related legislation</i>			
<i>Law 80</i>	10/10/2018	Integrated solid waste management law	The requirements of the law shall be adhered to for the management of solid wastes generated from the project.
<i>Law 78</i>	13/04/2018	Law for the protection of air quality	The requirements of the law shall be adhered to for the management of air emissions from the project.
<i>Law 77</i>	13/04/2018	Water Resources Law	Penalizes unauthorized discharges or disposal of any kind of waste in water resources
<i>MOE Decree 8803/2002 and its amendments,</i>	04/10/2002	Organizes the activity of quarries and crushers, licensing procedures, as well as the operation, management and rehabilitation of quarries.	Ensures the provision of construction material and the disposal of construction waste comply with the decree
<i>Law 444</i>	29/7/2002	Environmental protection framework law. Includes the general provisions for the protection of the environment.	Ensures project activities are in line with the requirements of the Law, particularly the articles in Chapter 5 on the protection of environmental media (air, coast, water, noise, facilities, natural resources, etc.)
<i>MOE Decision 8/1</i>	30/1/2001	Updates Decision 1/52 and in setting of the National Standards for Environmental Quality by the MOE	Ensures project activities comply with national environmental standards

³ Lebanon's legislative body is represented by the Lebanese Parliament that approves and issues Laws. Lebanon's executive body is represented by the Council of Ministers (COM) and is headed by the Presidency of the Council of Ministers. The COM enacts regulations in the form of Decisions (denoted COM Decision Number) and Decrees. Decisions are issued by a specific minister and are limited to the affairs of the ministry that promulgated it. Ministerial Decisions are subject specific.

<i>Legislation³</i>	<i>Date of Issue</i>	<i>Subject</i>	<i>Relevance to the project</i>
<i>Law 9</i>	20/02/1999	Establishment of the Tannourine Nature Reserve	Ensure project activities do not impact the reserve.
<i>MOE Decision 1/52</i>	12/9/1996	Setting of the National Standards for Environmental Quality by the MOE	Ensures project activities comply with national environmental standards
<i>Law 558</i>	24/07/1996	Law for the protection of forests	The requirements of the law shall be adhered to for the protection of forests.
<i>Decree 2761</i>	19/12/1933	Guidelines related to wastewater management and disposal	Ensures waste management activity comply with the decree
<i>Decree Law 8735</i>	23/08/1974	Maintaining general cleanliness	Ensures project activities adhere to this decree particularly in terms of waste disposal
<i>Cultural heritage related legislation</i>			
<i>Decree law 166</i>	7/11/1933	Antiquity law	Defines chance find procedures that should be followed in case antiquities were identified in the project site
<i>Urban/ rural planning and construction-related legislation</i>			
<i>Law 58</i>	29/05/1991	Expropriation Law	Adhere to provisions in case the project requires expropriation.
<i>Law 118</i>	30/06/1977	Municipalities Law. It stipulates the role of the Municipalities and Municipalities councils.	Defines the roles of municipalities in the provision of environmental services such as solid waste management, wastewater management, etc.
<i>Labor-related legislation</i>			
<i>Decree 3791</i>	30/06/2016	Sets minimum wage for employees and workers	Adhere to the requirements of this decree with regards to wages of employees on this project.
<i>Decree 8987</i>	29/09/2012	Prohibition of employment of minors under the age of 18 in work that may harm their health, safety or morals	Adhere to the requirements of this decree with regards to employment for this project.
<i>Decree 11802</i>	30/01/2004	Organizes prevention, safety and occupational health in all institutions subject to the Labor Law	Adhere to the requirements of this decree in terms of occupational health of staff working on the project
<i>Law 400</i>	05/06/2002	Allows the Government to ratify the Minimum Age Convention C-138, 1973	Adhere to the provisions of the convention in terms of prohibition of work to children less than 15 years of age
<i>Law 335</i>	02/08/2001	Allows the Government to ratify the Worst Forms of Child Labour Convention C-182, 1999	Adhere to the provisions of the convention in terms of prohibition of work which is likely to harm the health, safety or morals of children
<i>Labor Law</i>	23/09/1946	Labor law and its amendments	Adhere to provisions of the law and its amendments related to employment contracts, employment of children and women; work hours and holidays,

<i>Legislation³</i>	<i>Date of Issue</i>	<i>Subject</i>	<i>Relevance to the project</i>
			wages, dismissal, inspection, health and safety.
<i>Penal Code</i>	1/3/1943	Penal code	Abide by Article 522
<i>Traffic-related legislation</i>			
<i>Law 243</i>	25/10/2012	New traffic law	Adhere to requirements of this Law with regards to traffic movement of construction-related equipment, re-routing schemes, design of road signage, etc.

2.2 Institutional

Several ministries and government bodies are responsible for transport and traffic related activities in Lebanon including the:

- ❑ Council for Development and Reconstruction (CDR)
- ❑ Ministry of Public Works and Transportation (MoPWT)
- ❑ Ministry of Interior and Municipalities (MoIM)
- ❑ Ministry of Environment (MoE)
- ❑ Ministry of Culture (MoC) – Department of Antiquities (DoA).
- ❑ Ministry of Energy and Water/ Water Establishments/ Electricite du Liban
- ❑ Ministry of Agriculture (MoA)
- ❑ Ministry of Labor (MoL)

A statement of the transport/traffic related mission of each including aspects related to road-highway rehabilitation is summarized in Table 2-2. At this stage, it is expected that the proposed project will involve primarily the CDR. Since some proposed roads may pass near sensitive areas, close coordination with relevant ministries is also anticipated in the event any finds are made. At the completion of the project, the road becomes under the jurisdiction of the MoPWT for the purpose of maintenance and rehabilitation whenever required.

Table 2-2. Summary of functional responsibilities of transport/traffic involved ministries/agencies

<i>Agency</i>	<i>Mission</i>	<i>Role in project</i>
<i>Council for Development & Reconstruction (CDR)</i>	<ul style="list-style-type: none"> ❑ Plan and arrange for financing of projects including relations with donors and loan management ❑ Execute projects in all sectors ❑ Manage contracts in all sectors, including the transportation sector, which involve planning, design, construction, and supervision of construction 	<ul style="list-style-type: none"> ❑ Monitors activities of construction contractors to ensure delivery as per contracts, which will include mitigation and monitoring measures identified in the ESMP
<i>Ministry of Public Works and Transportation</i>	<ul style="list-style-type: none"> ❑ Organize and supervise land, maritime and air transport ❑ Construct, equip, manage and exploit publicly owned transport modes and facilities and develop them in 	<ul style="list-style-type: none"> ❑ Responsible for operating and maintaining these roads following project completion.

<i>Agency</i>	<i>Mission</i>	<i>Role in project</i>
<i>(MoPWT)</i>	<p>harmony with the social and economic development and according to the needs of the country</p> <ul style="list-style-type: none"> <input type="checkbox"/> Supervise the safety of transport means and facilities, its maintenance, modernization, and development <input type="checkbox"/> Prepare plans and conduct techno-economic studies aiming at operating transport means and facilities <input type="checkbox"/> Implement laws and regulations related to the transport and public maritime property <input type="checkbox"/> Exercise tutelage authority over the autonomous authorities and public enterprises in the public transport sector <input type="checkbox"/> Exercise control over transport concessions <input type="checkbox"/> Control and periodically update transport tariffs <input type="checkbox"/> Collect and analyze relative data and statistics and operate a road materials lab <input type="checkbox"/> Perform and oversee road design <input type="checkbox"/> Perform and supervise road studies and execution <input type="checkbox"/> Perform road maintenance <input type="checkbox"/> Take care of traffic safety in cooperation with other ministries/government agencies <input type="checkbox"/> Develop master and detailed plans for cities and villages, and establishing land use regulations <input type="checkbox"/> Develop road and street plans within cities and villages 	
<i>Ministry of Interior and Municipalities (MoIM)</i>	<ul style="list-style-type: none"> <input type="checkbox"/> Manage vehicle registration and inspection, and driver licensing <input type="checkbox"/> Enforce law, including that of the Traffic Code <input type="checkbox"/> Organize and manage civil defense activities and traffic related functions <input type="checkbox"/> Contribute to strengthening decentralization and activation of local government <input type="checkbox"/> Supervise municipal government units and ensure conformity with administrative and financial regulations <input type="checkbox"/> Coordinate among municipal units <input type="checkbox"/> Provide technical assistance and support to municipal governments <input type="checkbox"/> Cooperate and coordinate with other administrations on issues related to municipal and rural affairs 	<ul style="list-style-type: none"> <input type="checkbox"/> Municipalities involved in the project have a role in collaborating with the contractor to implement environmental management related measures including solid waste management, wastewater management, traffic management, etc.
<i>Ministry of the Environment (MoE)</i>	<ul style="list-style-type: none"> <input type="checkbox"/> Monitor and control of environmental protection, preservation of natural sites and amenities <input type="checkbox"/> Prevent pollution, protect wildlife, and preserve environmental balance <input type="checkbox"/> Set environmental standards, specifications and guidelines <input type="checkbox"/> Manage natural resources and amenities <input type="checkbox"/> Coordinate and encourage environmental awareness programs 	<ul style="list-style-type: none"> <input type="checkbox"/> Compliance of ESMP with the Lebanese environmental standards and regulations issued by MoE
<i>Ministry of Culture (MoC) –Department</i>	<ul style="list-style-type: none"> <input type="checkbox"/> Manage archeological finds <input type="checkbox"/> Review and approve project specific “Archeological Chance Find” procedures which would be used by 	<ul style="list-style-type: none"> <input type="checkbox"/> In case of archeological chance finds, review and approve project specific “Archeological Chance

<i>Agency</i>	<i>Mission</i>	<i>Role in project</i>
<i>of Antiquities</i>	construction contractors, consulting engineer and archaeological consultants to address actions to be taken if unrecorded archaeological materials are encountered during the course of project implementation	Find” procedures which would be used by construction contractors, consulting engineer and archaeological consultants to address actions to be taken if unrecorded archaeological materials are encountered during the course of project implementation
<i>Ministry of Energy and Water (MOEW)</i>	<ul style="list-style-type: none"> ❑ In charge of electricity, water, wastewater, irrigation and stormwater drainage projects. ❑ Authorities acting under its auspices are: 4 Water Establishments (Beirut & Mount Lebanon, North, South and Bekaa), the Litani River Authority and Electricite du Liban (EdL) 	<ul style="list-style-type: none"> ❑ Coordinate with relevant authorities under the MOEW in case of accidental damage to water and electricity related infrastructure during project implementation.
<i>Ministry of Agriculture (MoA)</i>	<ul style="list-style-type: none"> ❑ In addition to being in charge of the agricultural sector, the MOA is in charge of protecting and promoting the sustainable management of natural and genetic resources, including forests 	<ul style="list-style-type: none"> ❑ Coordinate with MOA in case of the need for tree cutting
<i>Ministry of Labor (MoL)</i>	<ul style="list-style-type: none"> ❑ Responsible for labor and employment issues. 	<ul style="list-style-type: none"> ❑ Ensure labor laws are adhered to

2.3 Environmental Standards

National environmental standards were issued by the MOE under Decision 1/52 of 1996 and Decision 8/1 of 2001. The latter overrides Decision 1/52 of 1996 and cancels Annexes 1, 2, 6, 7, 8, 9, 11 12, and 13 of Decision 1/52. The three most relevant standards to the current project are the maximum limits of ambient air quality (Table 2-3), the permissible ambient noise levels (Tables 2-4 and 2-5), and the wastewater discharge standards (Tables 2-6 and 2-7), since air and noise emissions as well as wastewater effluents are potential impacts associated with the rehabilitation of roads and should be mitigated to meet the national standards.

2.3.1 Air quality

Table 2-3. Maximum allowable ambient air quality concentrations as per MOE Decision 1/52

<i>Pollutant</i>	<i>Maximum limits ($\mu\text{g}/\text{m}^3$)</i>	<i>Avg period</i>
Sulfur Dioxide (SO_2)	350 120 80	1 hour 24 hours 1 year
Nitrogen Dioxide (NO_2)	200 150 100	1 hour 24 hours 1 year
Ozone (O_3)	150 100	1 hour 8 hours
CO	30,000 10,000	1 hour 8 hours
PM ₁₀	120	24 hours
Lead	1.0	1 year
Benzene	5 ppb	1 year

2.3.2 Noise levels

Table 2-4. Lebanese noise guidelines in different zones as per MOE Decision 1/52

<i>Area classification</i>	<i>Maximum accepted noise level dBA</i>		
	<i>Day¹</i>	<i>Evening²</i>	<i>Night³</i>
Business district	55 – 65	50 – 60	45 – 55
Residential area with few construction sites, commercial activities or on highway	50 – 60	45 – 55	40 – 50
Urban residential area	45 – 55	40 – 50	35 – 45
Residential suburb	40 – 50	35 – 45	30 – 40
Rural residential, hospital, public garden	35 – 45	30 – 40	25 – 35
Industrial zone	60 – 70	55 – 65	50 – 60

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

Note that the Lebanese noise standards were adopted primarily from the World Health Organization (WHO) standards, which are based on threshold levels for health impacts. Such standards are typically difficult if not impossible to meet near road projects and therefore abatement criteria promulgated by the US Federal Highway Administration (FHWA, 1997) (Table 2-5) are more commonly relied upon for noise impact assessments near road projects.

Table 2-5. Summary of FHWA noise abatement criteria

Land use category	FHWA Standard Leq (dBA)	Description of land use category
A	57 (exterior)	Land where serenity and quiet are of extraordinary importance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas, recreational areas, playgrounds, parks.
C	72 (exterior)	Developed lands, properties or activities not included in A and B
D		Undeveloped land
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

Source: FHWA (1997)

As for the national occupational noise exposure standards in work areas, they are far higher and include the following:

- ❑ 90 dB(A) for a duration of 8 hrs
- ❑ 95 dB(A) for a duration of 4 hrs
- ❑ 100 dB(A) for a duration of 2 hrs
- ❑ 115 dB(A) for a duration of 0.25 hrs

2.3.3 Wastewater discharge

Table 2-6. Limit values for wastewater discharged into the sewage network as per MOE Decision 8/1

<i>Parameter</i>	<i>ELV for existing and new facilities</i>
pH	6 – 9
Temperature	35°C
BOD ₅ mgO ₂ /L ⁴	125
COD mgO ₂ /L ⁵	500
Total Phosphorous mgP/L ⁶	10
Total Nitrogen, TN mg/L ⁷	60
Suspended Solids mg/L	600
AOX	5
Salmonellae	absence
Hydrocarbons mg/L	20
Phenol index mg/L	5
Oil and Grease mg/L	50
Total Organic Carbon (TOC) mg/L	750
Ammonia (NH ⁴⁺) mg/L ⁸	-
Silver (Ag) mg/L	0.1
Aluminium (Al) mg/L	10
Arsenic (As) mg/L	0.1
Barium (Ba) mg/L	2
Cadmium (Cd) mg/L	0.2
Cobalt (Co) mg/L	1
Chromium total (Cr) mg/L	2
Hexavalent Chromium (Cr ^{VI}) mg/L	0.2
Copper total (Cu) mg/L ⁹	1
Iron total (Fe) mg/L	5
Mercury total (Hg) mg/L	0.05
Manganese (Mn) mg/L	1
Nickel total (Ni) mg/L ¹⁰	2
Lead total (Pb) mg/L ¹⁰	1
Antimony (Sb) mg/L	0.3
Tin total (Sn) mg/L	2
Zinc total (Zn) mg/L ¹⁰	10
Cyanides (CN ⁻)mg/L	1
Fluoride (F ⁻) mg/L	15
Nitrate (NO ₃) mg/L ¹¹	-
Phosphate (PO ₄ ³⁻) mg/L ¹¹	-
Sulphate (SO ₄ ²⁻) mg/L	1,000
Sulphide (S ²⁻) mg/L	1

⁴ Assuming an outlet concentration of 25 mg/l and a cleaning capacity of 80 percent

⁵ Assuming an outlet concentration of 125 mg/L and a cleaning capacity of 75 percent

⁶ Assuming an outlet concentration of 2 mg/l and a cleaning capacity of 80 percent

⁷ Assuming connection to a biological waste water treatment plant. Performance of waste water treatment plant related to the concentration in the inflow: 70 – 80 percent, ELV at outlet: 15 mg/L N

⁸ Assuming connection to a biological waste water treatment plant. Performance of waste water treatment plant related to the concentration in the inflow: 70 – 80 percent, ELV at outlet: 15 mg/l N

⁹ ELV of 0.5 mg/L must be kept at the outlet of WWTP.

¹⁰ ELV of 0.5 mg/L must be kept at the WWTP outlet.

¹¹ ELV for total nitrogen and total phosphor has to be kept

Table 2-7. Limit values for wastewater discharged into the sewage network as per MOE Decision 8/1

<i>Parameter</i>	<i>ELV for existing and new facilities</i>
pH	6 – 9
Temperature	35°C
BOD ₅ mgO ₂ /L ¹¹	125
COD mgO ₂ /L ¹²	500
Total Phosphorous mgP/L ¹³	10
Total Nitrogen, TN mg/L ¹⁴	60
Suspended Solids mg/L	600
AOX	5
Salmonellae	absence
Hydrocarbons mg/L	20
Phenol index mg/L	5
Oil and Grease mg/L	50
Total Organic Carbon (TOC) mg/L	750
Ammonia (NH ⁴⁺) mg/L ¹⁵	-
Silver (Ag) mg/L	0.1
Aluminium (Al) mg/L	10
Arsenic (As) mg/L	0.1
Barium (Ba) mg/L	2
Cadmium (Cd) mg/L	0.2
Cobalt (Co) mg/L	1
Chromium total (Cr) mg/L	2
Hexavalent Chromium (Cr ^{VI}) mg/L	0.2
Copper total (Cu) mg/L ¹⁶	1
Iron total (Fe) mg/L	5
Mercury total (Hg) mg/L	0.05
Manganese (Mn) mg/L	1
Nickel total (Ni) mg/L ¹⁷	2
Lead total (Pb) mg/L ¹⁰	1
Antimony (Sb) mg/L	0.3
Tin total (Sn) mg/L	2
Zinc total (Zn) mg/L ¹⁰	10
Cyanides (CN ⁻)mg/L	1
Fluoride (F ⁻) mg/L	15
Nitrate (NO ₃) mg/L ¹¹	-
Phosphate (PO ₄ ³⁻) mg/L ¹¹	-
Sulphate (SO ₄ ²⁻) mg/L	1,000
Sulphide (S ²⁻) mg/L	1

¹¹ Assuming an outlet concentration of 25 mg/l and a cleaning capacity of 80 percent

¹² Assuming an outlet concentration of 125 mg/L and a cleaning capacity of 75 percent

¹³ Assuming an outlet concentration of 2 mg/l and a cleaning capacity of 80 percent

¹⁴ Assuming connection to a biological waste water treatment plant. Performance of waste water treatment plant related to the concentration in the inflow: 70 – 80 percent, ELV at outlet: 15 mg/L N

¹⁵ Assuming connection to a biological waste water treatment plant. Performance of waste water treatment plant related to the concentration in the inflow: 70 – 80 percent, ELV at outlet: 15 mg/l N

¹⁶ ELV of 0.5 mg/L must be kept at the outlet of WWTP.

¹⁷ ELV of 0.5 mg/L must be kept at the WWTP outlet.

¹¹ ELV for total nitrogen and total phosphor has to be kept

2.3.4 Gap analysis for national environmental standards

The national environmental standards were compared to their corresponding standards in the IFWBG Environmental Health and Safety General Guidelines (IFC, 2007). For ambient air quality, the WBG guidelines adopt the WHO ambient air quality guidelines. These guidelines are either the same or stricter than the maximum limits defined by the MOE.

Table 2-8. Comparison of national ambient air quality standards to WHO guidelines

<i>Pollutant</i>	<i>National standards as per Decision 1/52</i>		<i>WHO guidelines</i>	
	<i>Maximum limits ($\mu\text{g}/\text{m}^3$)</i>	<i>Avg period</i>	<i>Maximum limits ($\mu\text{g}/\text{m}^3$)</i>	<i>Avg period</i>
Sulfur Dioxide (SO ₂)	350	1 hour	500	10 minute
	120	24 hours	20	24 hours
	80	1 year		
Nitrogen Dioxide (NO ₂)	200	1 hour	200	1 hour
	150	24 hours		24 hours
	100	1 year	40	1 year
Ozone (O ₃)	150	1 hour		1 hour
	100	8 hours	100	8 hours
CO	30,000	1 hour	NA	1 hour
	10,000	8 hours		8 hours
PM ₁₀	120	24 hours	50	24 hours
			20	1 year
PM _{2.5}	NA	NA	25	24 hours
			10	1 year
Lead	1.0	1 year	NA	NA
Benzene	5 ppb	1 year	NA	NA

For noise levels, the WBG guidelines set the one hour Leq at 55 dBA during daytime and 45 dBA during nighttime for residential, institutional and educational areas. These are stricter than the FHWA standard (67 dBA) but less strict than the national standards (35-40 dBA) for rural areas.

As for the wastewater discharge, EHS Guidelines provides standards for discharge of treated sewage from an industrial facility to surface water. This does not apply to this project. National limit values for wastewater discharge into surface water and into the sewage network are more detailed in terms of parameters and will be adopted when necessary.

2.4 World Bank Policies

As stated above, the REP triggered the World Bank Operational Policy OP 4.01 requiring Environmental and Social assessment. As such, this ESMP report should comply with the safeguards policies and procedures of the World Bank–OP 4.01 on Environmental and Social Assessment to ensure environmentally sound and sustainable decision making. An ESMF was

prepared for the REP through CDR with support from the WB (CDR, 2018). The ESMF concluded that the REP activities are not expected to have significant environmental impacts and classified the REP under WB category B projects that require the preparation of an ESMP that is normally not associated with further screening or scoping studies for the various roads under consideration. Besides no significant environmental impacts, the ESMF equally anticipated no impacts on physical and cultural resources or natural habitats, no involuntary resettlement, and no land acquisition. The preparation of this ESMP considered the WBG Environmental Health and Safety General Guidelines.

Note that the ESMF recognized that the project implementation might result in small scale land acquisition or impacts on squatters or encroachers approaching to government lands or involuntary taking of land. Therefore, the project triggered the Bank policy on Involuntary Resettlement OP 4.12 and a resettlement policy framework (RPF) was prepared according to the World Bank policy and relevant Lebanese laws and regulations as a guideline for resettlement. However, the proposed roads in the Bcharre district do not involve involuntary resettlement or land acquisition.

2.4.1 Access to Information (AI) policy

Introduced in 2010, the World Bank's Policy on Access to Information (AI Policy) has made the Bank a more effective development partner Based on the concept that any information in the Bank's possession is public, except for that which falls under a defined list of exceptions, the AI Policy remains the standard for international development institutions. It has also provided the basis for the accompanying open initiatives—including Open Data, Open Finances, the Open Knowledge Repository, and the Open Archives—all of which make the Bank's work more transparent, accessible, and accountable.

2.4.2 EHS guidelines

The preparation of this ESMP considered the WBG Environmental Health and Safety General Guidelines which are consistent with the CDR Safety, Health, and Environmental Regulations for Construction Projects (Annex C).

2.5 International treaties and conventions

Lebanon has ratified several international conventions related to the environment in general. Selected laws of relevance to the project impact assessment are summarized in Table 2-8.

Table 2-9. International laws and conventions signed by Lebanon

<i>Date & Place Signed</i>	<i>Treaty</i>	<i>Relevance to the project</i>
1994 <i>Rio de Janeiro ratified via Law 359 dated 1/8/1994</i>	UN framework convention on climate change with the aim to stabilize greenhouse gas concentrations at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system.	Considers greenhouse gas emissions
1992 <i>Rio de Janeiro ratified via Law 360 dated 1/8/1994</i>	UN framework convention on Biological Diversity: Conservation of biological diversity, sustainable use of its components, and fair and equitable sharing of benefits from the use of genetic resources, including appropriate access to such resources and transfer of relevant technologies	Considers terrestrial biodiversity in the vicinity of the project.

3 PROJECT DESCRIPTION

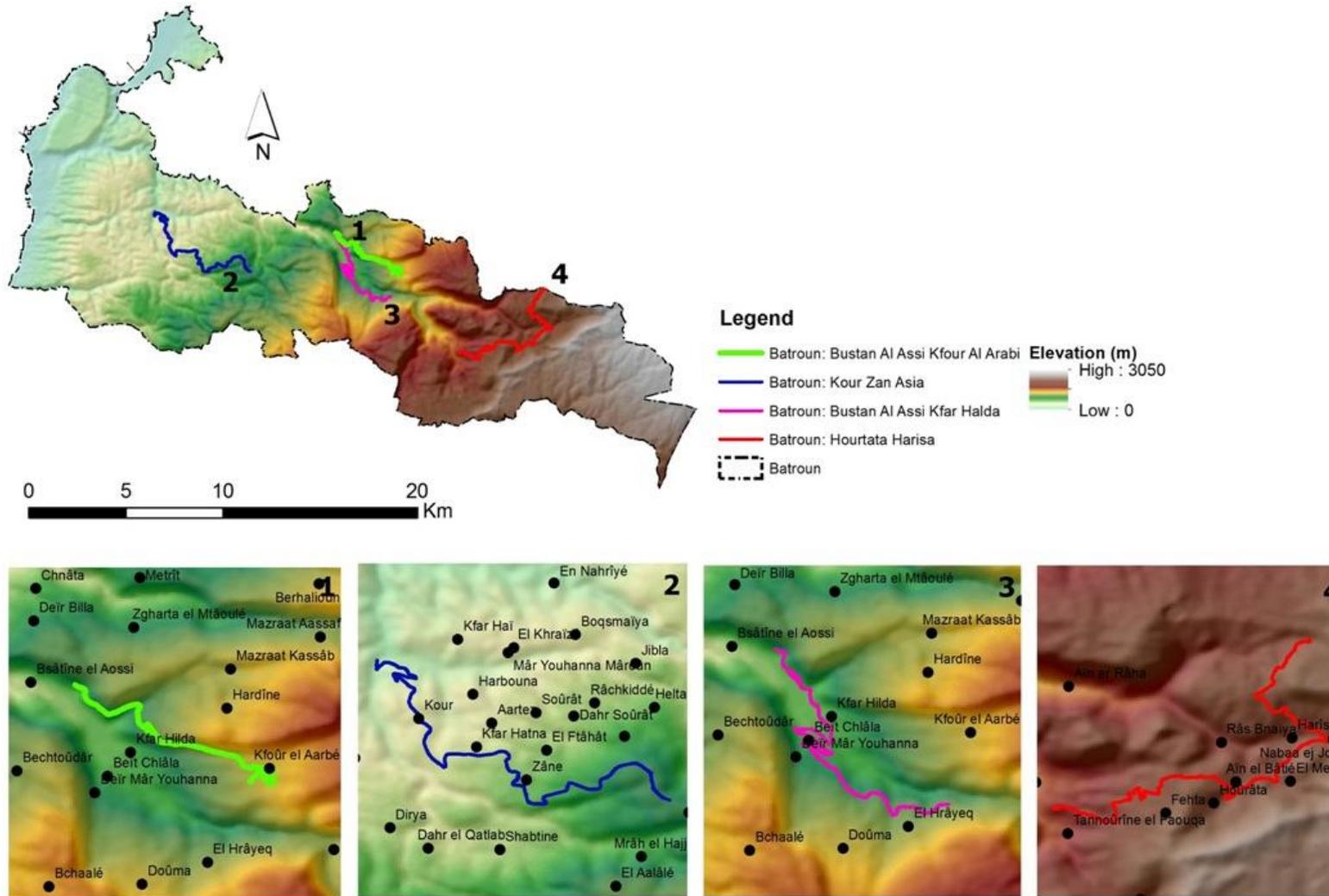
As stated above, the GOL solicited and obtained WB financing for the REP being implemented by CDR towards improving transport connectivity along select paved road sections and create short term employment opportunities for local communities (skilled Lebanese and poor Syrian refugees). The selection of road sections was based on a number of criteria that considers the pavement and safety condition of the road, the level of traffic, the balancing of roads between regions and communities, the balancing of road sections by categories (primary, secondary, and tertiary), and the labor creation potential with broader socioeconomic impacts. Using these criteria, several roads were selected in the Batroun Caza rehabilitation, maintenance, and minor construction. Activities to be performed vary between one road and the other, depending on the road rating in terms of the condition of the pavement, shoulders, potential flooding and drainage, potential landslide/soil erosion and retaining walls, and/or pedestrian walkways.

3.1 Location

The proposed roads for rehabilitation in the Batroun Caza are located inland with Figure 3-1 showing a general layout of the proposed Roads (4 – 5 – 6 – 7N) and the surrounding areas. The location and coordinates of the proposed roads in addition to key characteristic features or potential sensitive receptors are presented in Table 3-1 and the alignment of each road is shown in figures 3-2 to 3-5.

- Road 4 (Figure 3-2) starts at Tannourine El Faouqa at the existing Bcharre – Tannourine highway and extends for a length of about 11 km passing through the villages of Hourata and Harisa, until it reaches an end at the Batroun - Bcharre Caza limits.
- Road 5 (Figure 3-3) start at Aaqbet Fnaideq and extends approximately 3 km towards Kfar Halda, where it crosses the Jaouz River, and then continues for another 5 km along Batroun - Tannourine highway until it reaches the village of Hrayeq.
- Road 6 (Figure 3-4) starts at Ain Aaya just outside the existing Batroun – Tannourine highway, and it extends for about 11 km passing through the villages of Kour, Zan, and Aassia.
- Roads 7N (Figure 3-5) starts at Aaqbet Fnaideq and extends from about 10 km towards the village of Kfour El Arabi.

Figure 3-1. Location overview and elevation of proposed roads within Batroun district



Source: Layers by CNRS

Table 3-1. Location and characteristics of Batroun district proposed roads

<i>Road code</i>	<i>Location</i>	<i>Villages From to</i>	<i>Coordinates</i>		<i>Width range (m)</i>	<i>Length (Km)</i>	<i>Elevation range (m)</i>	<i>Key features</i>
			<i>Start</i>	<i>End</i>				
<i>Road 4</i>	Bcharre-Tannourine Road Tannourine El Faouqa – Hourata – Miel – Harisa at Caza Limits	Hourata-Harisa	34°11'11.9"N 35°54'04.0"E	34°13'02.9"N 35°56'54.7"E	5-7	11	1468- 1814	Bcharre-Tannourine main road, high elevations, scattered residential buildings, few restaurants
<i>Road 5</i>	Aaqbet Fnaideq – Kfar Halda – Beit Chlala Batroun-Tannourine Road – Jaouz River-Hrayeq	Bassaten Al Ossi – Kfar Helda- Beit Chelala	34°14'22.9"N 35°49'50.0"E	34°12'41.3"N 35°51'45.1"E	5-7	5.6	585-692	Relatively steep, Jaouz River, agriculture, few residence-s
<i>Road 6</i>	Ain Aaya (outside Batroun – Tannourine Road) – Kour – Kfar Hatna – Zan – Aassia	Kour-Zan-Assia	34°14'49.2"N 35°43'42.6"E	34°13'11.7"N 35°47'13.6"E	5-7	11	209-806	Secondary road, few residences and restaurants, church, monastery, pine trees
<i>Road 7N</i>	Aaqbet Fnaideq – Chir Kfar Hilda – Kfour El Arabi	Bassateen Al Ossi- Kfour Al Arabi	34°14'22.9"N 35°49'50.0"E	34°13'20.1"N 35°51'44.5"E	5-7	6	655- 1086	Secondary road, olive trees, rock formations, small village

Projected Coordinate System: WGS_1984_UTM_Zone_63N

Figure 3-2. Road alignment of Batroun Road 4 (Hourata - Harisa) with contour elevations

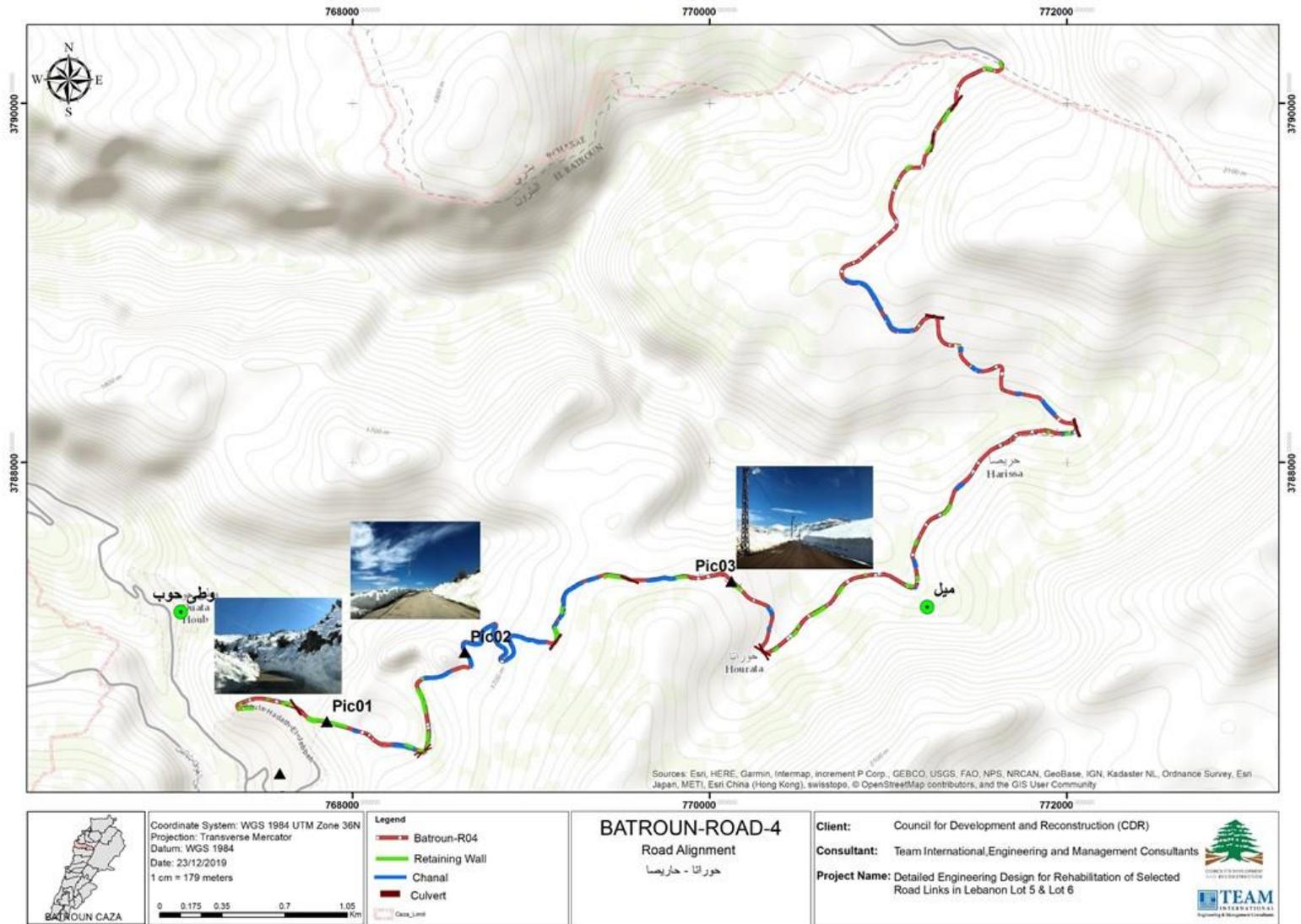


Figure 3-3. Road alignment of Batroun Road 5 (Bassaten Al Ossi - Beit Chelala) with contour elevations

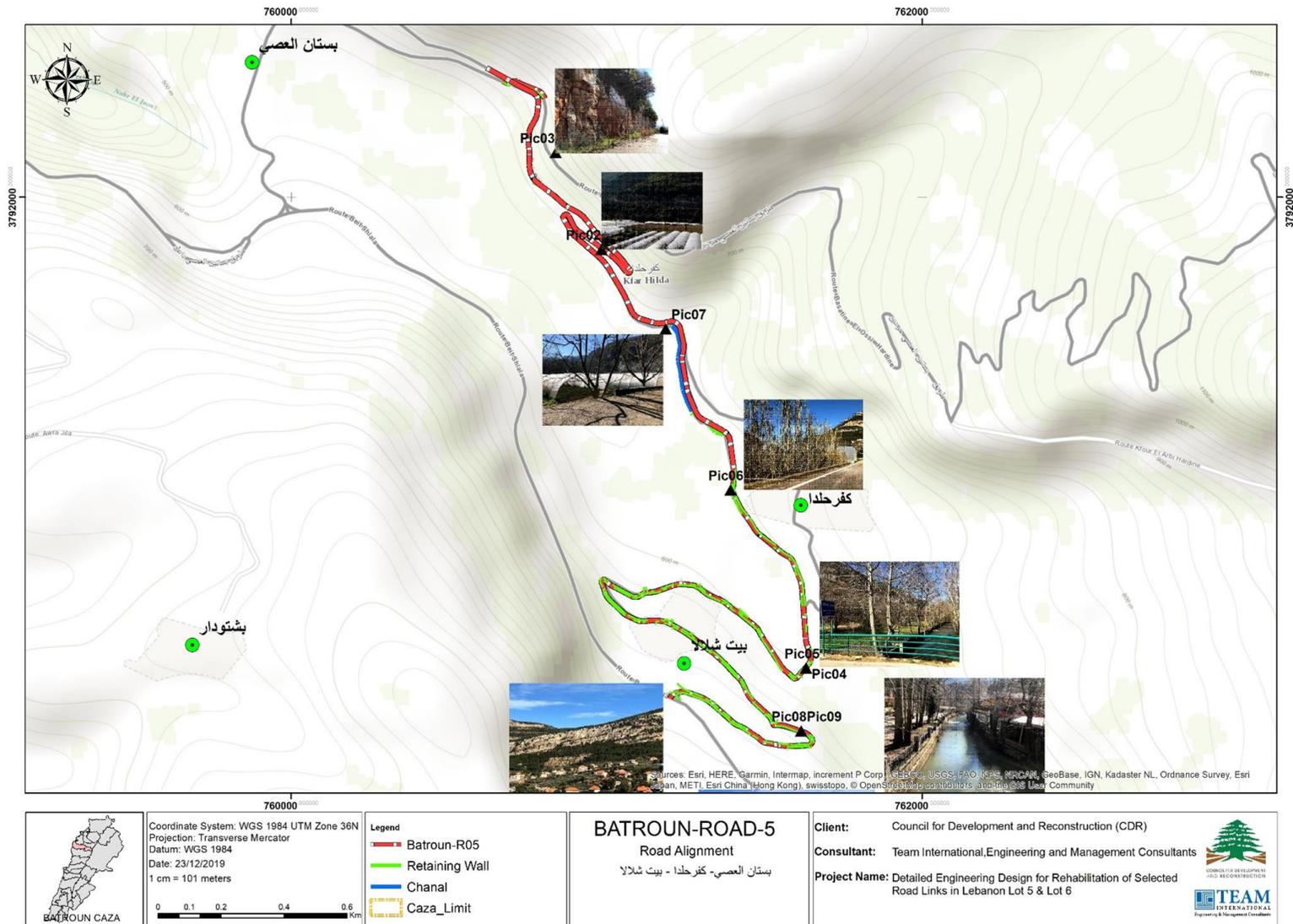


Figure 3-4. Road alignment of Batroun Road 6 (Kour-Zan-Assia) with contour elevations

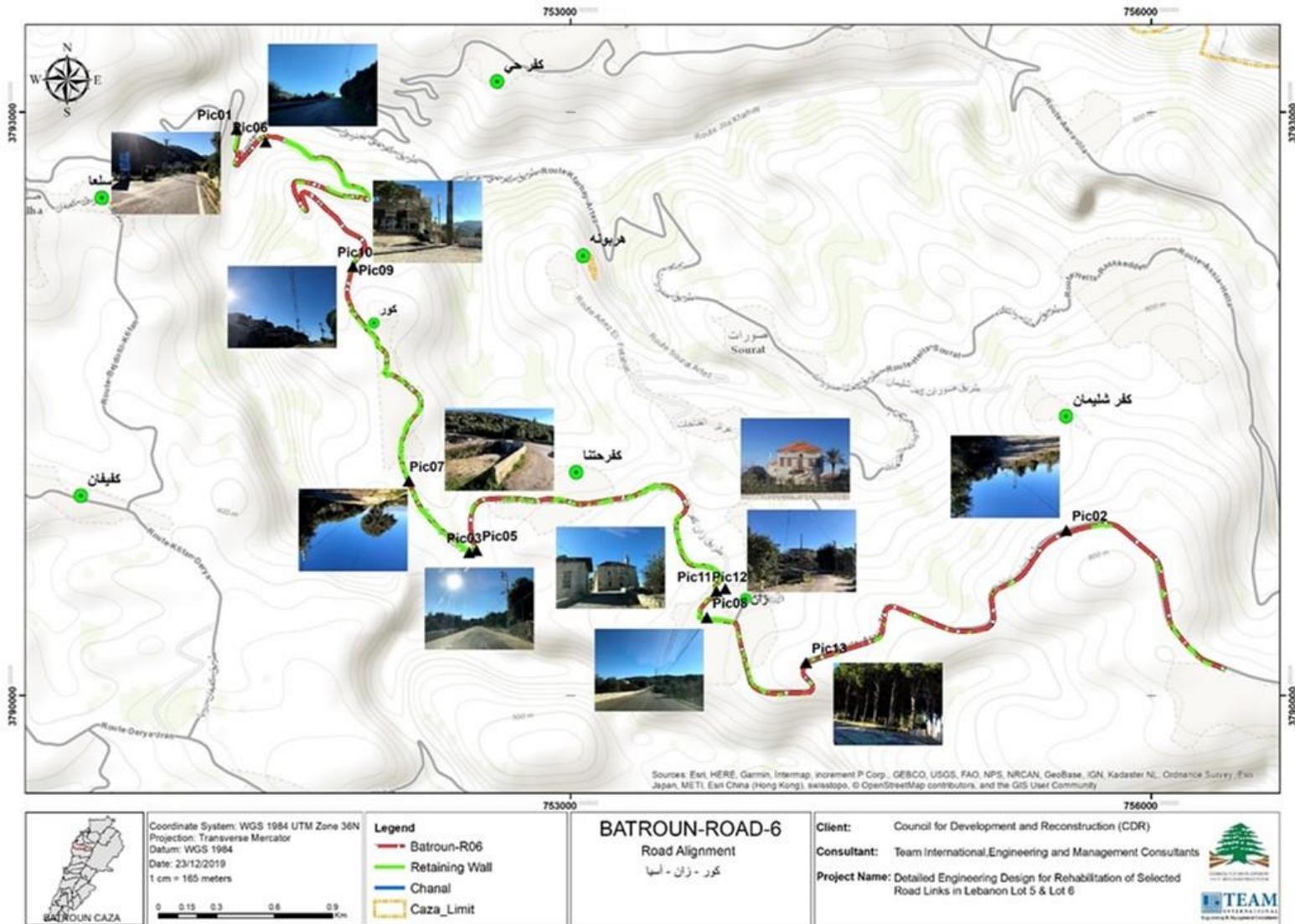
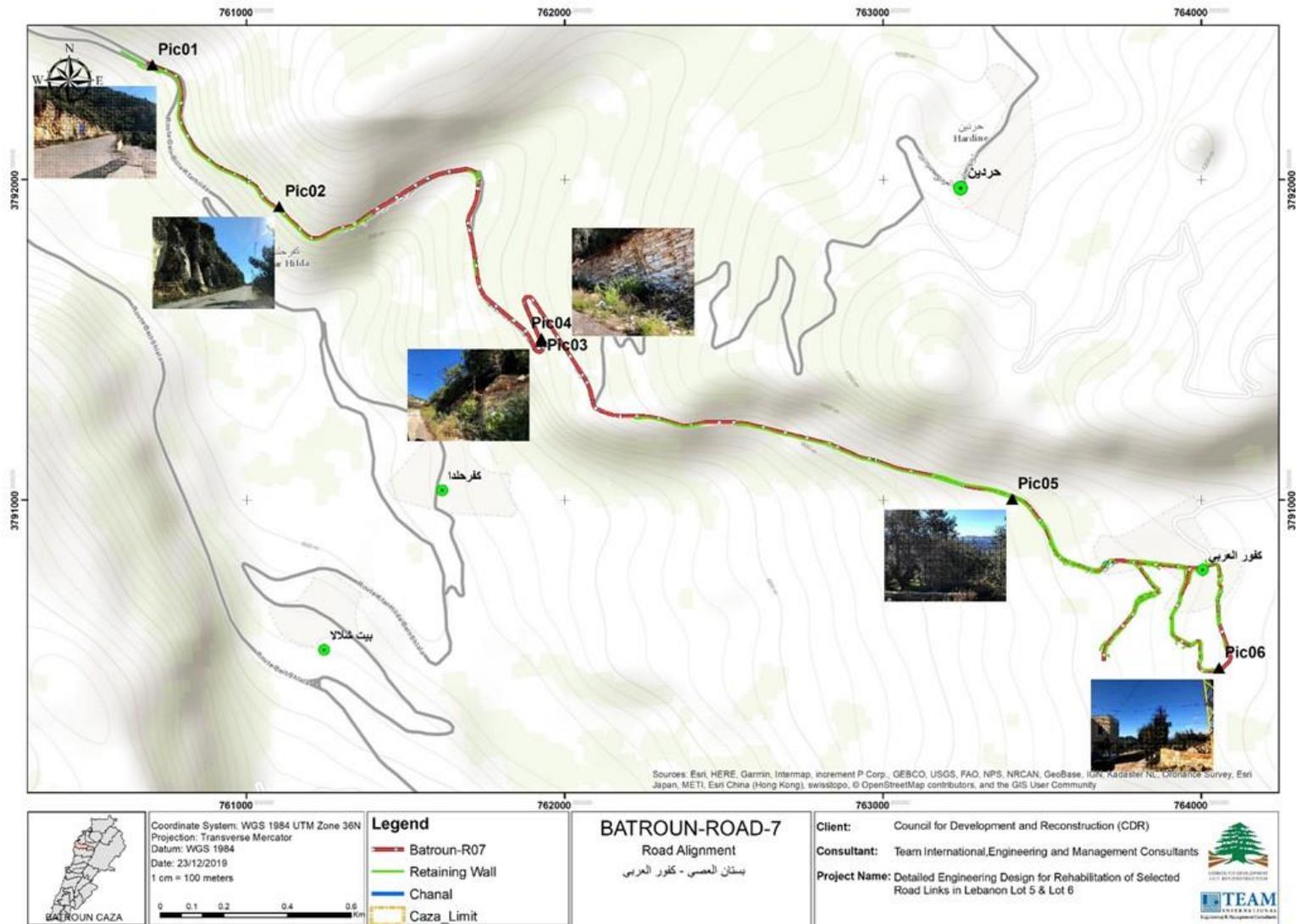


Figure 3-5. Road alignment of Batroun Road 7N (Bassatin Al Ossi - Kfour Al Arabi) with contour elevations



3.2 Project activities

The main civil works which are expected to take place under the REP including the Batroun caza may include:

- ❑ Construction and reconstruction of retaining walls/footwalls;
- ❑ Pavement reconstruction (aggregate base course, bituminous base course, ...);
- ❑ Pavement rehabilitation (Milling & overlay, deep & shallow pothole patching, crack sealing);
- ❑ Structural concrete repair;
- ❑ Sidewalk repairs and construction;
- ❑ Pedestrian Crossings (grade separation/at grade);
- ❑ Improvement of the median barrier (construction and repairs);
- ❑ Median/Side lighting system and all related electrical and civil works;
- ❑ Road marking & signing;
- ❑ Storm water drainage improvement (construction and repairs);
- ❑ Safety barriers: New Jersey/ Texas barrier and steel guard rail;
- ❑ Relocation/Expansion of existing utilities as applicable;
- ❑ Other ancillary and associated works including traffic management during construction;
- ❑ Reinstatement of roads disturbed by the works and tapering to the existing roads as necessary.

More specifically, Table 3-2 summarizes the main design elements to be executed along the roads, in addition to asphaltting, along with the quantities of construction material needed. Note that the excavations will not exceed 40 cm in depth minimizing potential interference with existing infrastructure such as water supply.

Table 3-2. Design elements along proposed Batroun district roads with estimated construction material

<i>Road code and villages</i>	<i>Excavation depth From – to (cm)</i>	<i>Excavation Volume (m³)</i>	<i>Retaining walls No. and length (m)</i>	<i>Culverts Number</i>	<i>Sidewalks (m)</i>	<i>Construction Material needed</i>			
						<i>Reinforced Concrete (m³)</i>	<i>Reinforcing Steel (ton)</i>	<i>Crushed Aggregate Base Course (m³)</i>	<i>Asphalt Concrete (m³)</i>
<i>Batroun Road 4 Hourata-Harisa</i>	20-40	6,000	100-3,200	32	0	200	20	6,413	4,300
<i>Batroun Road 5 Bassaten Al Ossi – Kfar Helda- Beit Chelala</i>	20-40	2,000	15- 500	8	Total L~ 200	60	6	1,504	1,200
<i>Batroun Road 6 Kour-Zan-Assia</i>	20-40	5,500	30- 1,000	10	Total L~ 500	150	15	4,100	2,900
<i>Batroun Road 7 Bassateen Al Ossi- Kfour Al Arabi</i>	20-40	2,600	15-500	8	0	100	10	816	1,300

3.3 Material and Equipment

The following are the types of construction equipment which may be used. Other equipment may be added as needed by the site activities.

- JCBs
- Excavators with jack hammers
- Milling machines
- Bobcats
- Pavers
- Rollers
- Graders
- Shovels
- Soil Compactors
- Pickup trucks
- Trucks
- Pickup trucks with integrated small cranes
- Bitumen tanks with spreaders
- Air Compressors
- Power generators
- Asphalt saw cutters.

The Contractor will not install on-site any plants for asphalt and concrete batch.

3.4 Site Staffing

At this stage, the final number of workers needed for the REP in Caza of Batroun is based on estimation since the total volume of each activity as per the bill of quantities of the tender documents is not prepared yet by the awarded Contractor. Therefore, it is estimated that the rehabilitation works would require the workforce of 150 to 200 laborers.

3.5 Site facilities

The Project site will not include on-site facilities such as site offices for Engineers and for the Contractor, laborers camps, lodging on site, containers, power generators and repair garages.

During the work implementation, the Contractor will have to rent a flat located in the Project area to serve as Project Offices. These offices will be used by the Contractor Engineers, technical skilled workers and Supervising Consultants. The flat will be equipped with toilets, kitchen (including drinking water and appliances), lockers and other supplies needed for the daily administrative

activities. It might also serve as a meeting point for all Project workers at the start and end of their shifts.

The work implementation will also require unskilled workers (laborers) needed to perform earthworks on-site. The Contractor will be encouraged to hire laborers from the local community living in the Project area. During working hours, laborers will be entitled with a one-hour break on-site. Usually, every laborer brings from home his own food and drinking water. The on-site rest point will be decided by the Contractor at the time of works.

The Contractor will have to service the on-site with portable cabin toilet. The porta cabin will be mobile and its placement depends on the length of the work zone. Accordingly, the Contractor will have to move it based on the progress of rehabilitation works. The Contractor should link the porta cabin toilet to the existing wastewater network. In case the network is not available within the work zone, the Contractor will need to link it to a polyethylene storage tank and the Supervising Consultant shall inspect it on a regular basis and ensure emptying the tank when filled into the nearest wastewater network.

For vehicles and equipment, the Contractor will have to rent a land within the Project area. This land should be fenced and used for parking purpose only. The Contractor shall not perform any repair on site and is obliged to execute vehicles and equipment maintenance in a repair shop preferably located within the Project area.

4 BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

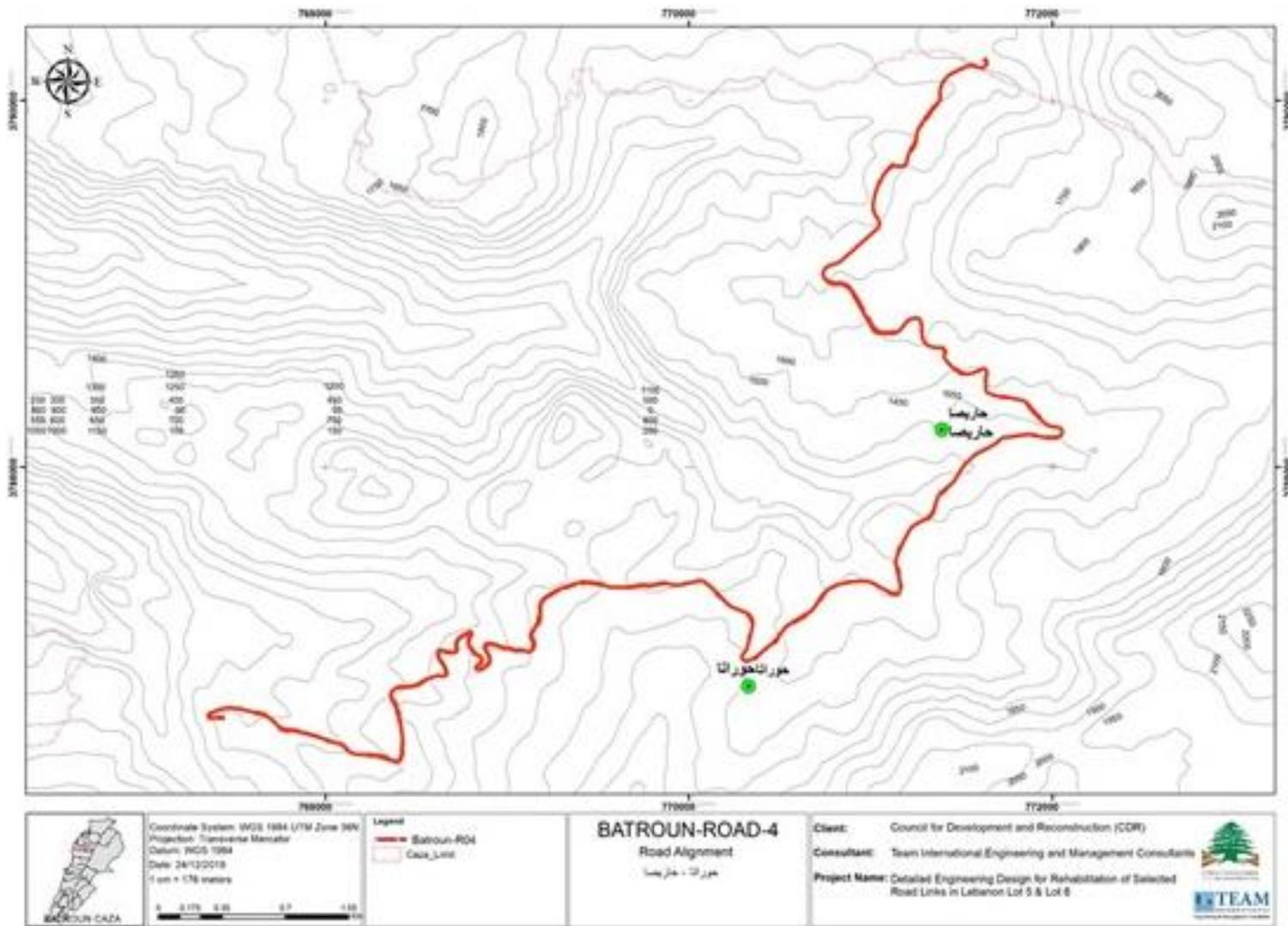
The preparation of the ESMP report included field surveys to observe and document baseline conditions. Information related to coverage deemed important in the context of the ESMP was synthesized and processed using the geographic information systems (AcrGIS Desktop Version 10.61 by ESRI, License type: Advanced) to prepare the maps presented in this report. Field observations coupled with reported literature form the basis for defining the physical, biological, and social characteristics of the general project area as outlined below.

4.1 Physical environment

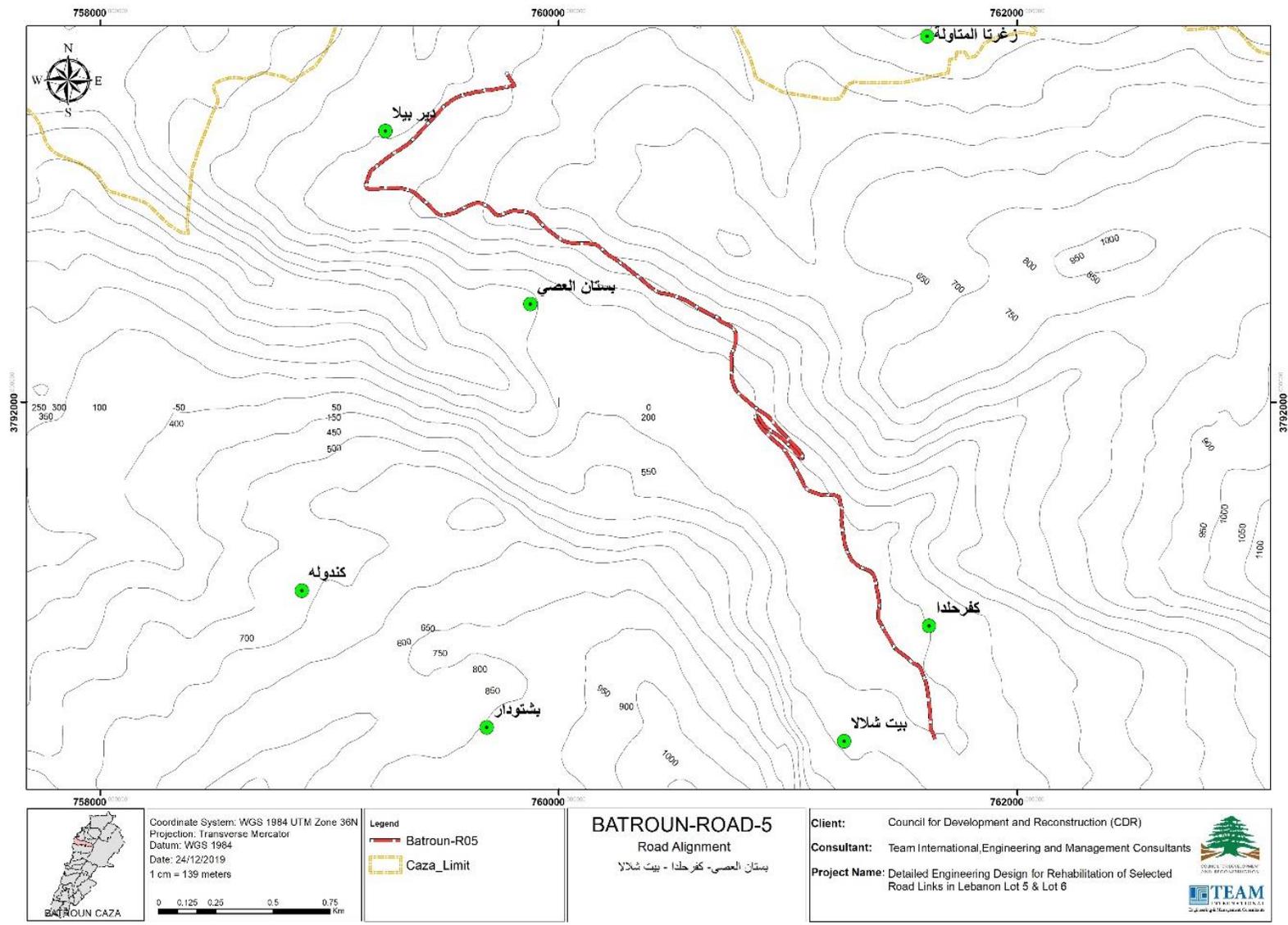
4.1.1 Topography

Road 4 is located at relatively high elevations varying between 1,400 and 1,900 m ASL. Roads 5 and 7N fall between 800 and 1,000 m ASL. Road 7N has relatively small constant slopes (Figure 4-2), while Road 5 crosses the Jaouz River at a small valley (Figure 4-3). Finally, Road 6 falls at elevations varying between 300 and 800 m ASL. The general topographic maps of the proposed Batroun roads and surroundings were presented in Figures 3-1 to 3-4 and in Figure 4-1 below.

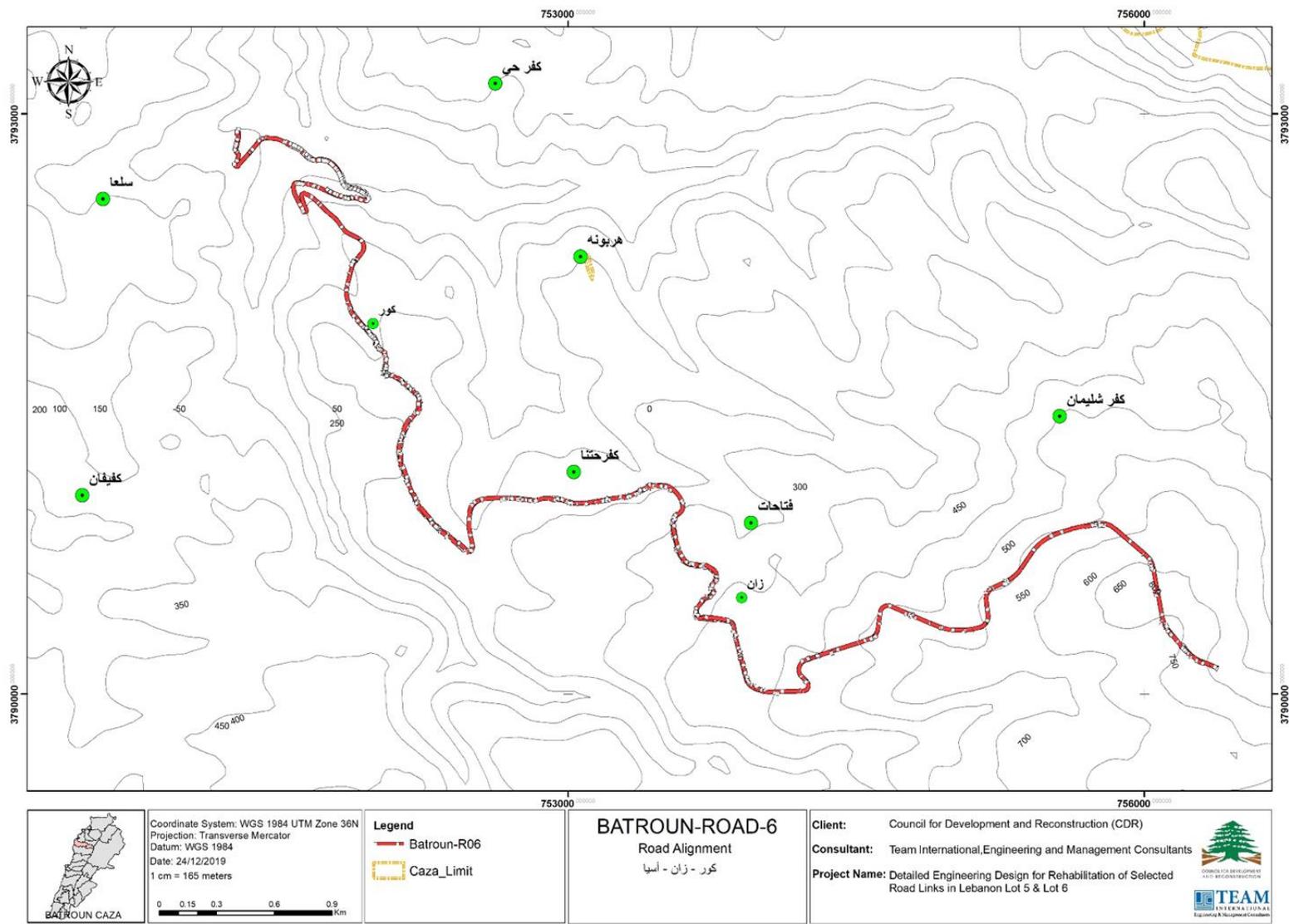
Figure 4-1. Contour maps for the proposed roads in the Batroun district



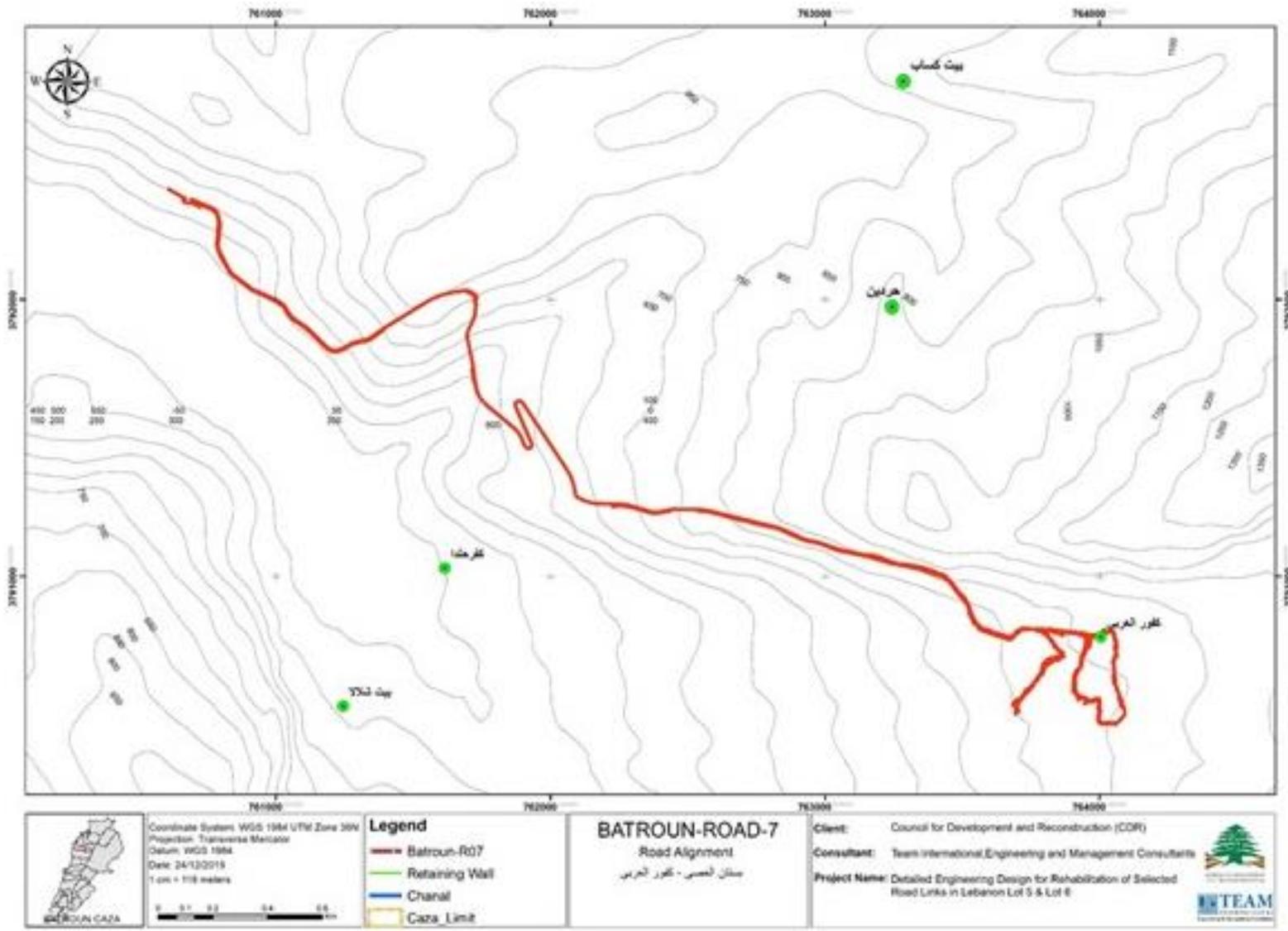
Road 4 (Hourata - Harisa)



Road 5 (Bassaten Al Ossi - Beit Chelala)



Road 6 (Kour – Zan - Assia)



Road 7N (Bassatin Al Ossi - Kfour Al Arabi)

Figure 4-2. Relatively gentle slopes along Road 7N (Bassateen Al Ossi- Kfour Al Arabi)



*Road 7, Kfar Halda (34°14'08.2"N 35°50'05.3"E)
A. Maalouf, A. Chehab, M. (Jan, 2019)*

Figure 4-3. Relatively flat terrain at the valley along Road 5 (Bassaten Al Ossi – Kfar Helda- Beit Chelala)



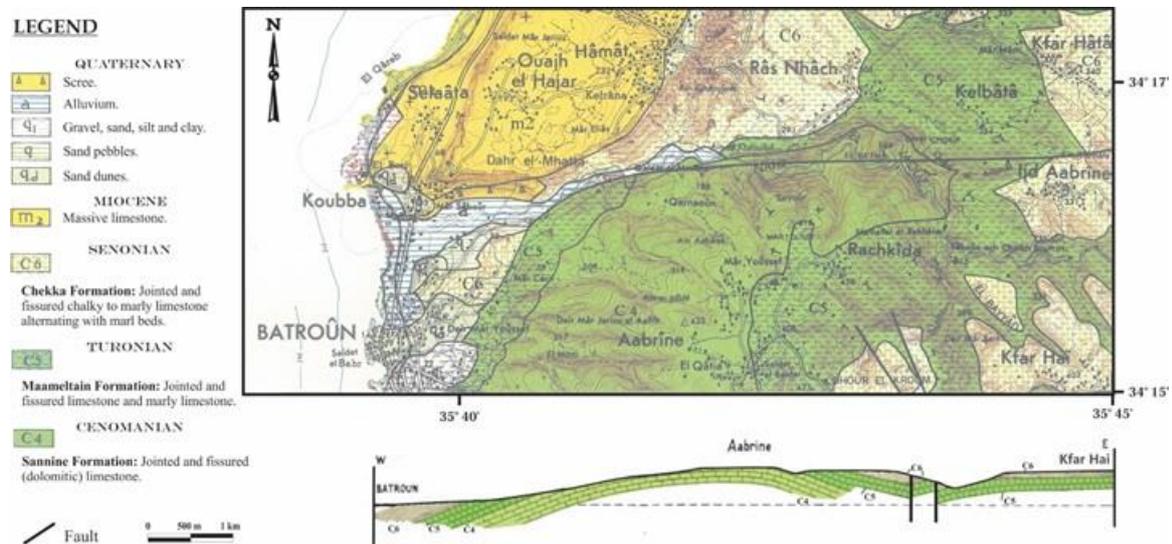
*Road 5- Kfar Halda, near Jaouz River (34°14'08.2"N 35°49'56.3"E)
A. Maalouf, A. Chehab, M. (Jan, 2019)*

4.1.2 Geology

4.1.2.1 Lithology and main geological formations

Based on the geological map (Figure 4-5), The predominate lithology in the Batroun Caza is limestone that belongs to the Jurassic (Kesrouane J4) and Sannine (C4) formations. Their beds show bending and dipping in opposite directions denoting the presence of a local anticline (see cross section in Figure 4-4). Near the coastline, a series of quaternary deposits (q) overly the cretaceous sequence and outcrop at the surface. It shows lithological variations, mainly sand pebbles, sand dunes, and sequences of gravel, sand, silt and clay. A layer of conglomerates-limestone from the lower Miocene (mcg) outcrops at Koubba and Hamat to the north of Batroun (Figure 4-5). It is made of massive limestone, and forms small cliffs overlooking the Chekka-Batroun Highway. This gives rise to the accumulation of broken rock fragments downslope, which are known as scree. Slumps occur in the Senonian marl as well, and may lead to slope failures, especially where part of the resisting masses are removed due to the highway. None of the roads crosses the Senonian marl or the conglomerates-limestone of the Miocene formation (Table 4-1).

Figure 4-4. Illustrative geological map of the Batroun area, north Lebanon

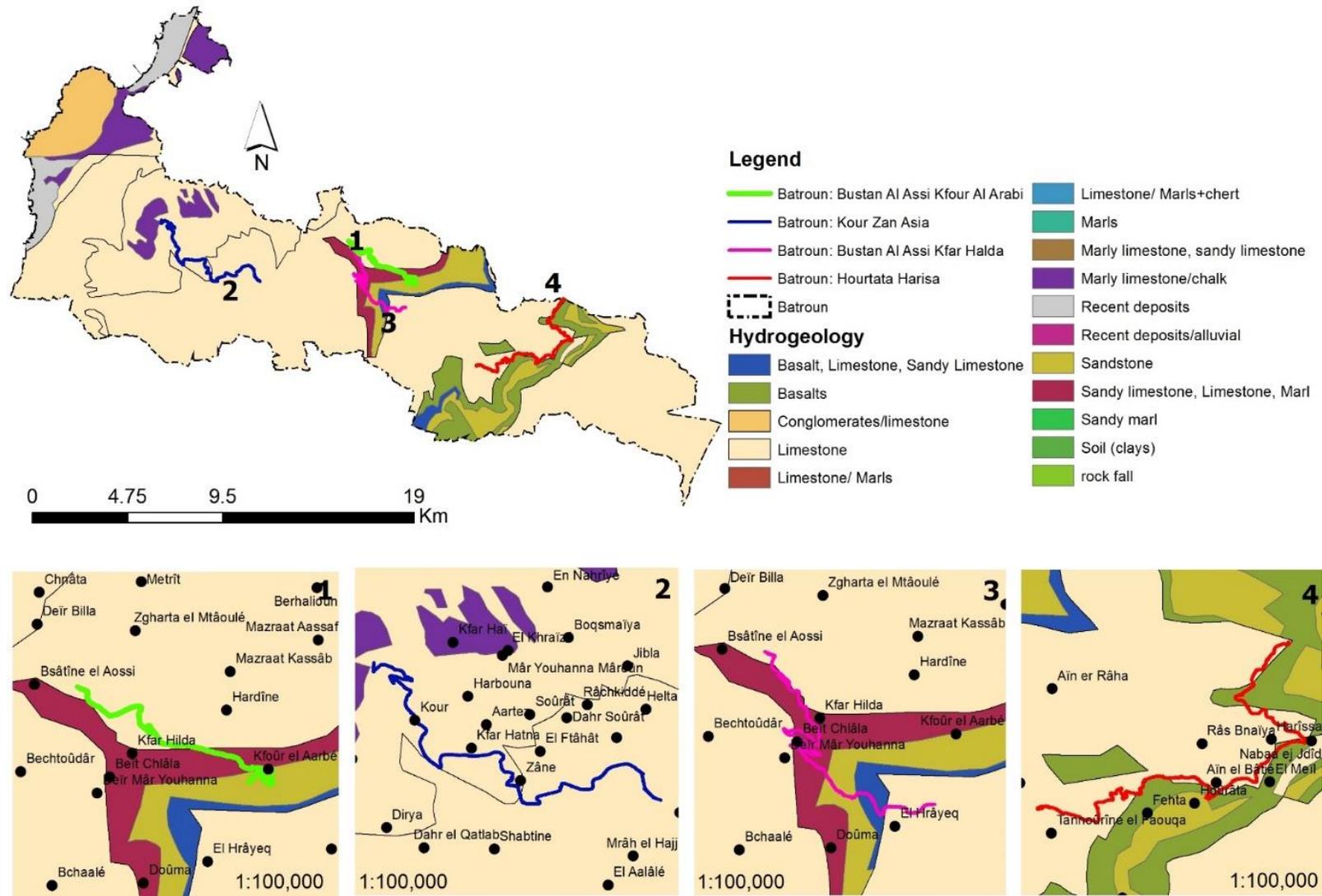


Source: Adapted from Dubertret M. and Wetzal M., 1945. Carte Geologique detaille au 1:50,000, feuille de Batroun, Liban. Delegation Generale de France au Levant, Beirut.

Table 4-1. Main lithology and formations crossed by proposed roads

<i>Road</i>	<i>Lithology</i>	<i>Formation</i>
Road 7: Bustan Al Assi Kfour Al Arabi	Sandstone	Chouf (C1)
	Sandy limestone, Limestone, Marl	Abeih, Mdairej, Hemmana (C2a,C2b,C3)
	Limestone	Sannine (C4)
Road 6: Kour Zan Asia	Limestone	Maameltain (C5)
	Limestone	Sannine (C4)
Road 5: Bustan Al Assi Kfar Halda Beit Chelala	Sandstone	Chouf (C1)
	Basalt, Limestone, Sandy Limestone	Bhannes, Bikfaya,Salima (J5,J6,J7)
	Sandy limestone, Limestone, Marl	Abeih, Mdairej, Hemmana (C2a,C2b,C3)
	Limestone	Sannine (C4)
	Limestone	Kesrouane (J4)
Road 4: Hourata Harisa	Basalts	Pliocene (p)
	Limestone	Kesrouane (J4)

Figure 4-5. Lithology of the Batroun district and along proposed roads

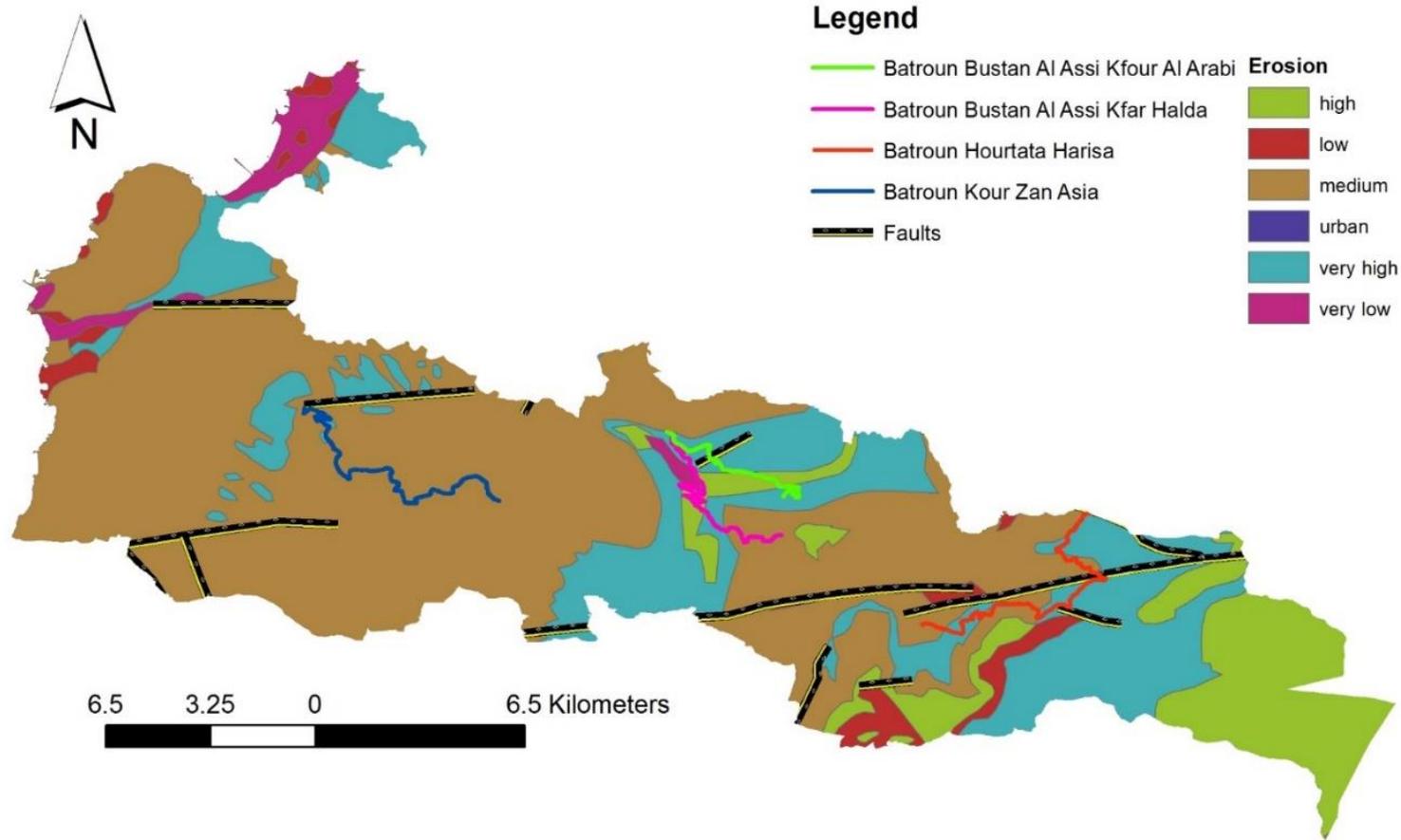


CNRS database – updated from UNDP 1970

4.1.2.2 Faults, erosion, landslides, and earthquakes

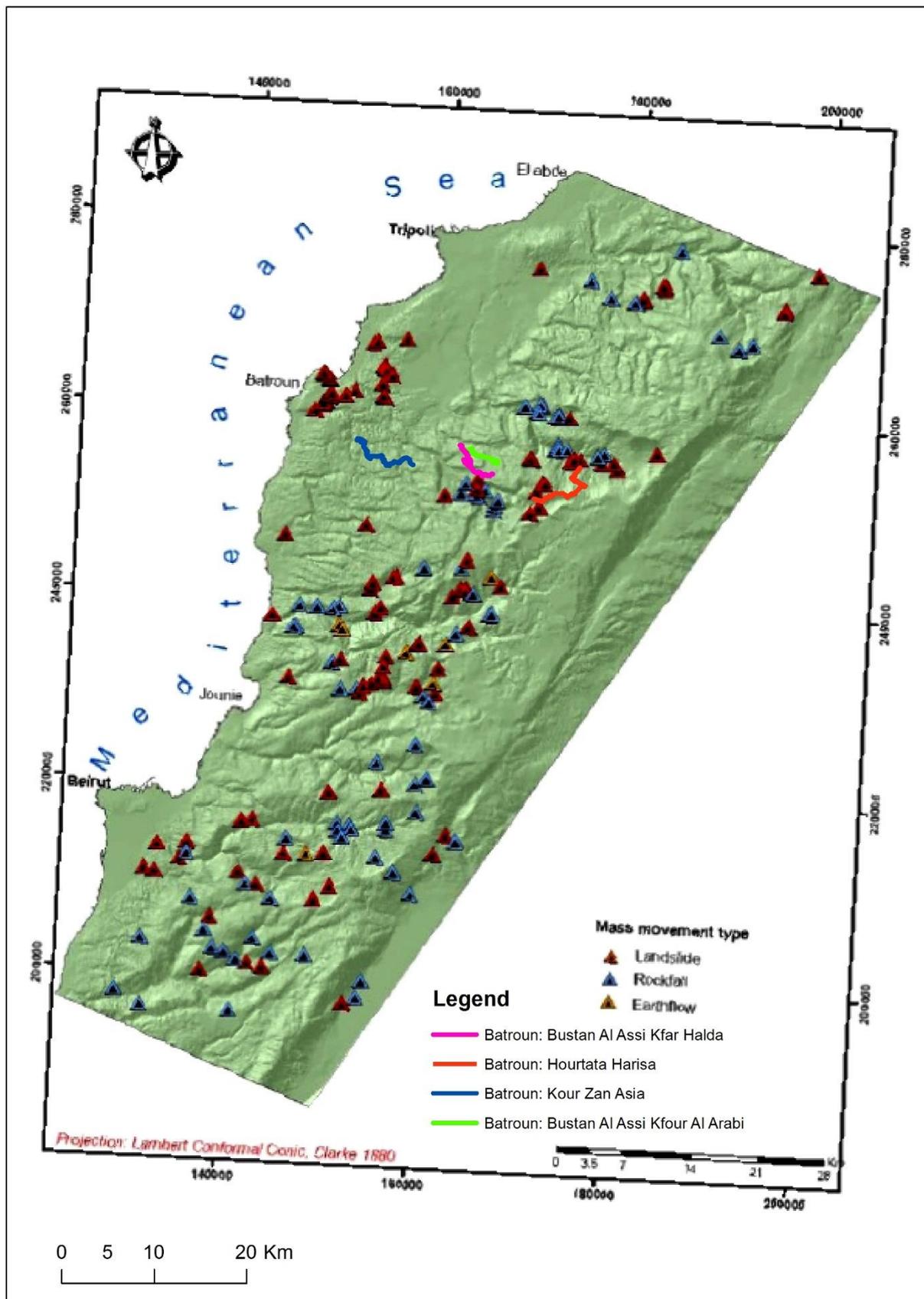
Several faults crisscross the Batroun Caza. All 4 roads either lie within 150 m of a fault line or are crossed by one (Figure 4-6). The risk for erosion across the 4 proposed roads ranges from very low to very high. The erosion risk for Road 4 (Bustan Al Assi Kfour Al Arabi) is high to very high. The neighboring Road 5 (Bustan Al Assi Kfar Halda Beit Chelala) starts with medium erosion risk in the east and then transitions to very high and high erosion risk in the middle sections, before transitioning into a small section of low erosion risk in the west and a larger section of very high erosion risks along its western sections. Along Road 6 (Kour Zan Asia) the erosion risk is mostly medium with small pockets of very high risks. Finally, Road 4 (Hourtata Harisa) crosses through regions with medium to very high erosion risks. With regards to landslide hazards, the area appears to be prone to them, especially towards the west (Figure 4-7). Only the western sections of Road 6 (Kour Zan Asia) appears to be prone for such risks. The other 3 roads do not appear to be prone to landslides. Seismic risks in the study area exist, given that it lies along the 1000-km-long left-lateral Levant fault system (LFS). This fault system is responsible for a significant amount of seismic events in the eastern Mediterranean (Hujeir et al., 2011). For the study area, the EZ-FRISKTM model developed by Hujeir et al., (2011) predicts that the 10% probability of peak ground accelerations (PGA) exceedance in 100-year ranges between 0.3 and 0.35 g. With these levels of seismic hazards, civil engineering projects such as bridges should adopt reinforcement (in reinforced concrete structures) of “high seismic hazard” as established in international codes of practice (Hujeir et al., 2011).

Figure 4-6. Faults and erosion risk in the Batroun district



Source: CNRS Soil Erosion database and Faults database

Figure 4-7. Landslides, rockfall sites, and earthflows



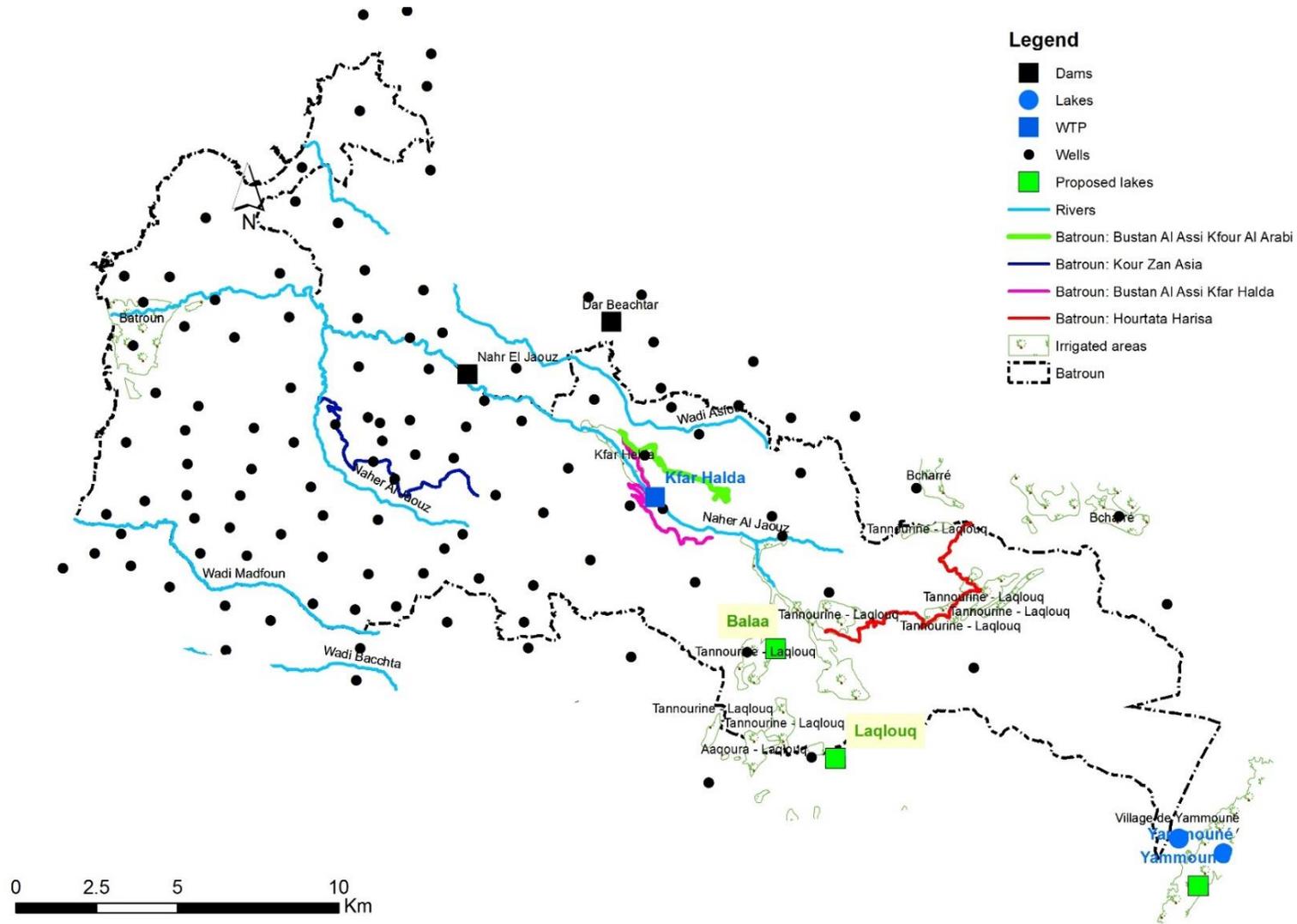
Source: Abdallah 2007

4.1.3 Hydrology

The study area includes several springs, groundwater wells, streams, rivulets, and the Jaouz River as shown in **Error! Reference source not found.**Figure 4-8. Road 5 intersects the Jaouz River, overpassing a small bridge (Figures 4-9 and 4-10). The river water is largely used for the irrigation of the agricultural lands along its banks, while drinking water is obtained mostly from groundwater wells as well as from natural springs. A study by Khalaf et al. (2007) on the biological quality of the Jaouz River revealed that overall, the river is poor in benthic invertebrate macrofauna and diatomic microflora due to anthropogenic activities. It distinguished between three river sections: (i) a section upstream from the village of Tannourine, with a rich and diverse benthic fauna and an oligosaprobic diatomic flora indicating a good biological water quality; ii) a section downstream of Tannourine (close to Road 5) corresponding to the discharge of wastewater, here the values of the different indices are low and chironomids are abundant, self-purification follows in this section improving the biological quality of the water; (iii) the middle and lower courses presenting a deterioration of water quality essentially due to climatic and hydrologic conditions.

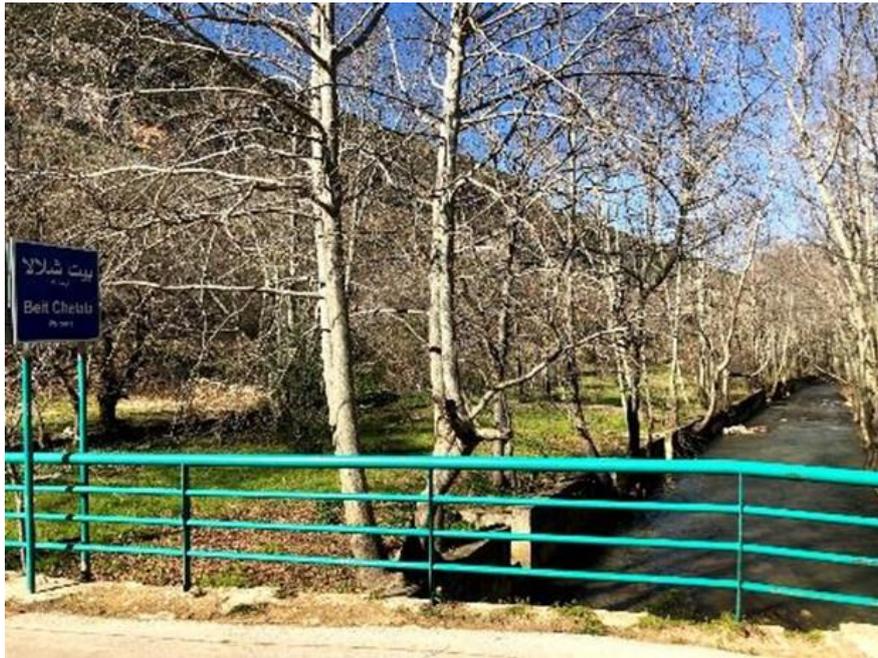
The Dalli spring is a major source of potable water for the study area. The capacity of the water treatment plant in 2001 was 12,000 m³/day (MoE, 2001). As can be seen from Figure 4-8, Road 5 (Bustan Al Assi Kfar Halda Beit Chelala) passes in the immediate vicinity of the Kfar Halda water treatment plant. Additionally, 3 of the proposed roads cross within regions that have an irrigation scheme (Road 4: Bustan Al Assi Kfour Al Arabi, Road 5: Bustan Al Assi Kfar Halda Beit Chelala, Road 4: Hourata Harisa). None of the roads passes in the immediate vicinity of any of the proposed and/or existing dams and hill lakes.

Figure 4-8. Hydrology and water resources surrounding proposed roads in the Batroun district



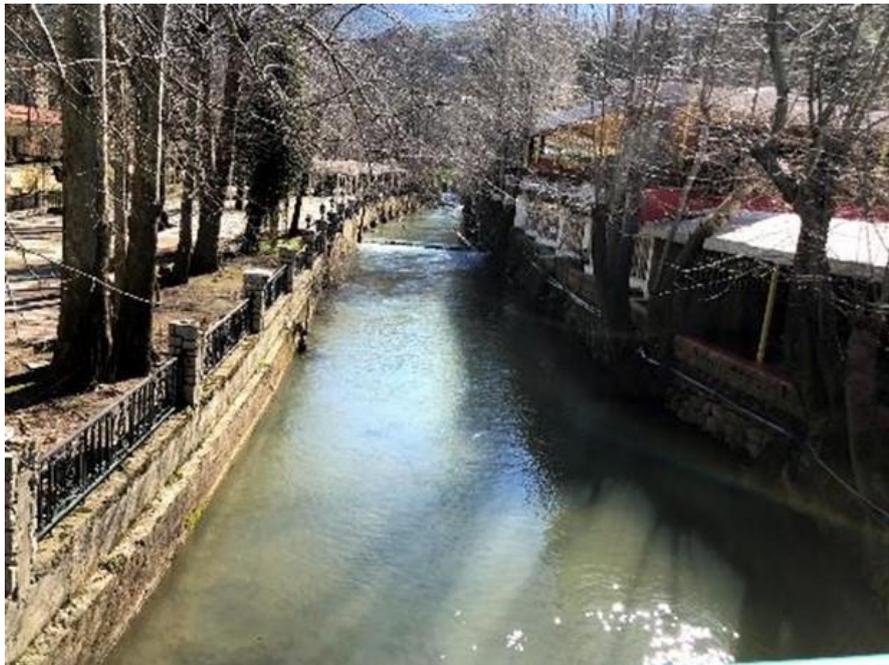
Source: GIS layers by MOEW 2012

Figure 4-9. Bridge at the intersection of Road 5 (Bassaten Al Ossi – Beit Chelala) and Al Jaouz River



*Road 5-(Bassaten Al Ossi – Beit Chelala) ($34^{\circ}13'22.4''N$ $35^{\circ}50'24.4''E$)
A. Maalouf, A. Chehab, M. (Jan, 2019)*

Figure 4-10. Al Jaouz River passing at intersecting Road 5 (Bassaten Al Ossi – Beit Chelala)

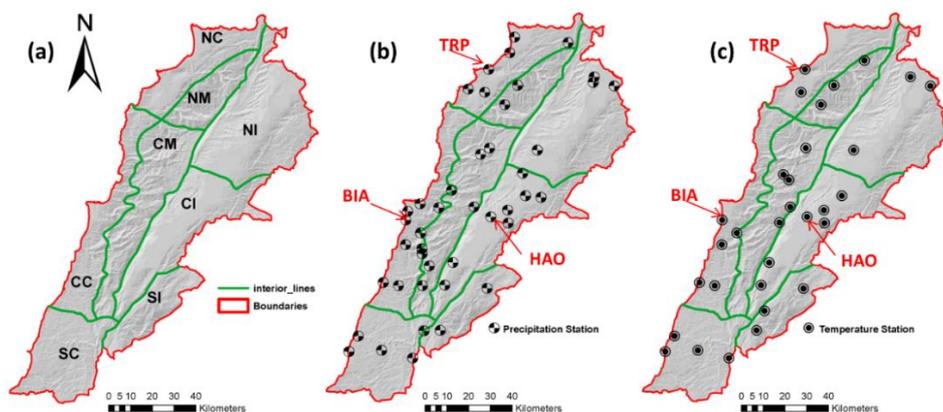


*Road 5-(Bassaten Al Ossi – Beit Chelala) ($34^{\circ}13'22.4''N$ $35^{\circ}50'24.4''E$)
A. Maalouf, A. Chehab, M. (Jan, 2019)*

4.1.4 Climate and meteorology

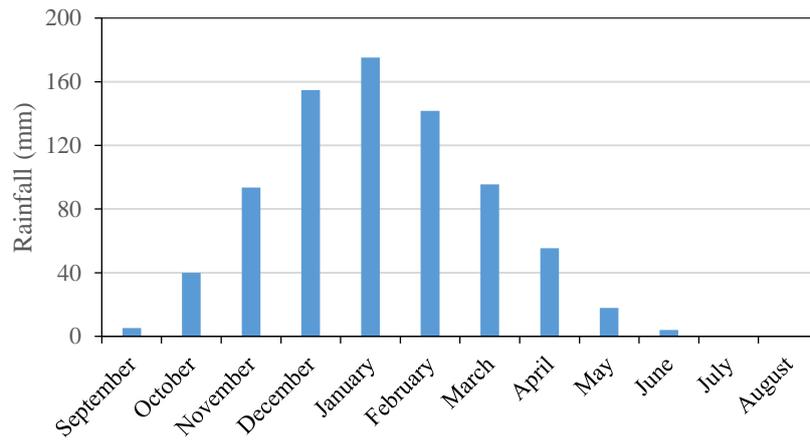
The climate and meteorological parameters play an important role in the transport and dispersion of pollutants in the atmosphere. Moreover, climate and meteorology play a role in the timing of construction activities and potential road closures during both the rehabilitation and operational phases. As such, meteorological data on precipitation, temperature, wind direction and speed are important for the assessment of environmental impacts. Wind speeds and wind directions are responsible for carrying pollutants from the proposed roads to nearby communities both during the rehabilitation and operation phases. On the other hand, precipitation controls the rates of runoff. Meteorological data for the study region are best represented through long term monitoring stations in that region. While there are no monitoring stations in the immediate vicinity of the proposed roads, data from a recent national study (Figure 4-11) that was synthesized in the context of climate change modeling (El-Samra et al., 2018) was relied upon. The study used data reported in the Atlas Climatique du Liban; NOAA's National Climatic Data Center, Lebanese National Meteorological Services (LNMS), Lebanese Agricultural Research Institute (LARI), and the American University of Beirut Advancing Research Enabling Communities Center (AREC). In addition, long-term average representative precipitation and temperature for the Batroun Caza are presented in Figure 4-12 and 4-13, respectively. As can be seen, the summer season between the months of June and September is dry with limited precipitation, while the highest amounts of precipitation are usually recorded during the month of January. Annual precipitation volumes vary across years and locations. They range from as low as 600 mm to as high as 1,200 mm. In addition, at high elevations, snow is common occurrence and may hinder construction activities. The warmest month of the year is August (average monthly of 24.95°C) and the coldest is January (average monthly of 10.3°C). With respect to wind, the closest weather station equipped with a functional anemometer is in Bcharreh and is operated by LARI. The windrow for the year 2018 from that station is shown in Figure 4-14. Calm winds are predominant (0 to 0.5 m/s) blowing from the West (17 percent of the time) and South-West (35 percent of the time).

Figure 4-11. (a) Lebanon geoclimatic regions, (b) rain gauges locations, (c) temperature stations locations with records of daily average and/or maximum and minimum temperatures, per geoclimatic region Stations used to calculate the anomaly (BIA, TRP and HAO) score are indicated in red



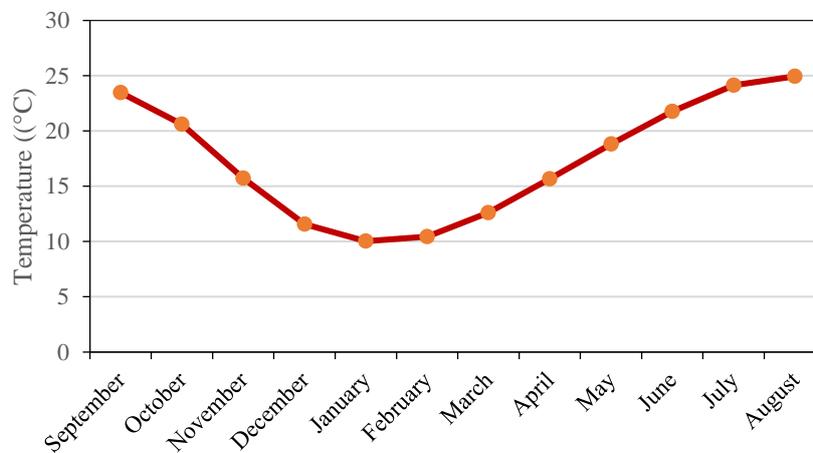
Source: El-Samra et al. 2018

Figure 4-12. Average monthly rainfall values for Batroun district (1901-2015) at location (34.2,35.91)



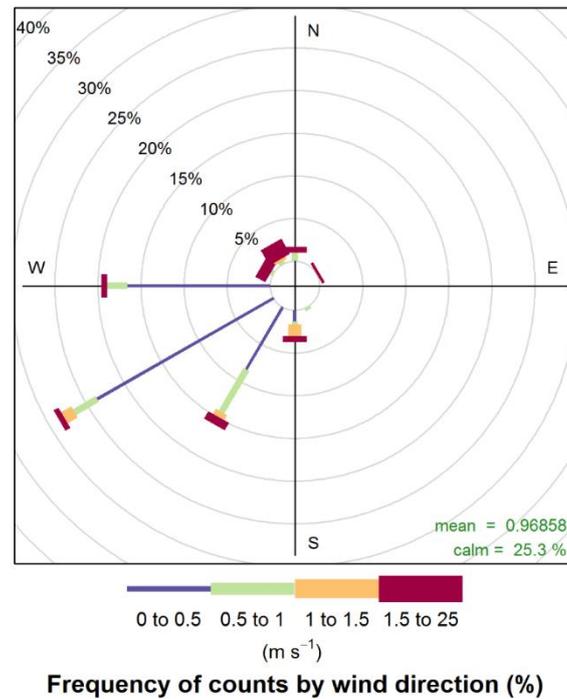
Source: Data retrieved from The World Bank Group 2019

Figure 4-13. Average monthly temperature values for Batroun district (1901-2015) at location (34.2,35.91)



Source: Data retrieved from The World Bank Group 2019

Figure 4-14. Wind speed and wind direction from the Bcharre weather station for the year 2018



4.1.5 Ambient air quality and noise levels

Traffic emissions represent the main source of air pollution in the project area with generators constituting another source in residential areas at times of electricity disconnection. Major air pollutants induced by traffic include Carbon monoxide (CO), Nitrogen Oxides (NO_x), Sulfur oxides (SO_x), Hydrocarbons (HC), and Particulate matter (PM). These pollutants are associated with potential adverse health impacts with long-term exposure to atmospheric concentrations exceeding threshold limits. Air quality monitoring in Lebanon in general is weak and adhoc with no systematic continuous monitoring. It is based mostly on individual efforts at academic institutions with a recent effort through the MoE that acquired several stations spread throughout Lebanon, particularly in urban areas. Unfortunately, the stations have stopped because of lack of resources and the existing data is not reliable because of lack of equipment calibration, to the best of our knowledge.

Annual average ambient air quality data were reported by JICA (2018) for part of the Batroun Caza (Figure 4-15). Data for Cell 5 is considered to be the most representative, being the closest to this study area in terms of distance as well as prevalent socio-economic activities, i.e. mostly rural and light residential. Table 4-2 shows that the annual concentrations for all criteria air pollutants for Cell 5 and for the other cells which are located close to the urban, industrial coastline are below the national ambient air quality standards defined by MOE Decision 52/1. Note that the source of the data reported in JICA (2018) was not clearly stated.

Figure 4-15. Air quality cells as per the JICA (2018)



Source: JICA 2018

Table 4-2. Average annual ambient concentrations of air pollutants in the Batroun district

Pollutant	Annual average concentration ($\mu\text{g}/\text{m}^3$)		
	Cell 5	Min and max for the 5 cells	National ambient air quality standards (MOE Decision 52/1)
PM _{2.5}	17.4	16.3-20.6	80 $\mu\text{g}/\text{m}^3$
PM ₁₀	27.3	27.3-37.3	120 $\mu\text{g}/\text{m}^3$
CO	341	304-472	10,000 $\mu\text{g}/\text{m}^3$
SO ₂	17.4	17.0-47.6	80 $\mu\text{g}/\text{m}^3$
NO ₂	19.1	15.3-29	100 $\mu\text{g}/\text{m}^3$
O ₃	80.8	73.0-87.9	100 $\mu\text{g}/\text{m}^3$

Source: JICA 2018

Similarly, vehicles and some generators in residential areas constitute the main source of noise. While no noise measurements are available along the proposed roads, various studies have been conducted on noise measurements in specific projects / studies although no systematic noise monitoring in the country exists. In the context of the proposed roads it is expected that the baseline average continuous A-weighted noise levels during the day time will vary between 55 to 80 dBA depending on time of day, traffic conditions and proximity to the roads. This range was deduced from noise measurements conducted in 2017 along segments of a nearby rural road of similar nature in the Batroun Caza (JICA 2018). Note that these levels exceed the national standards of 30-40

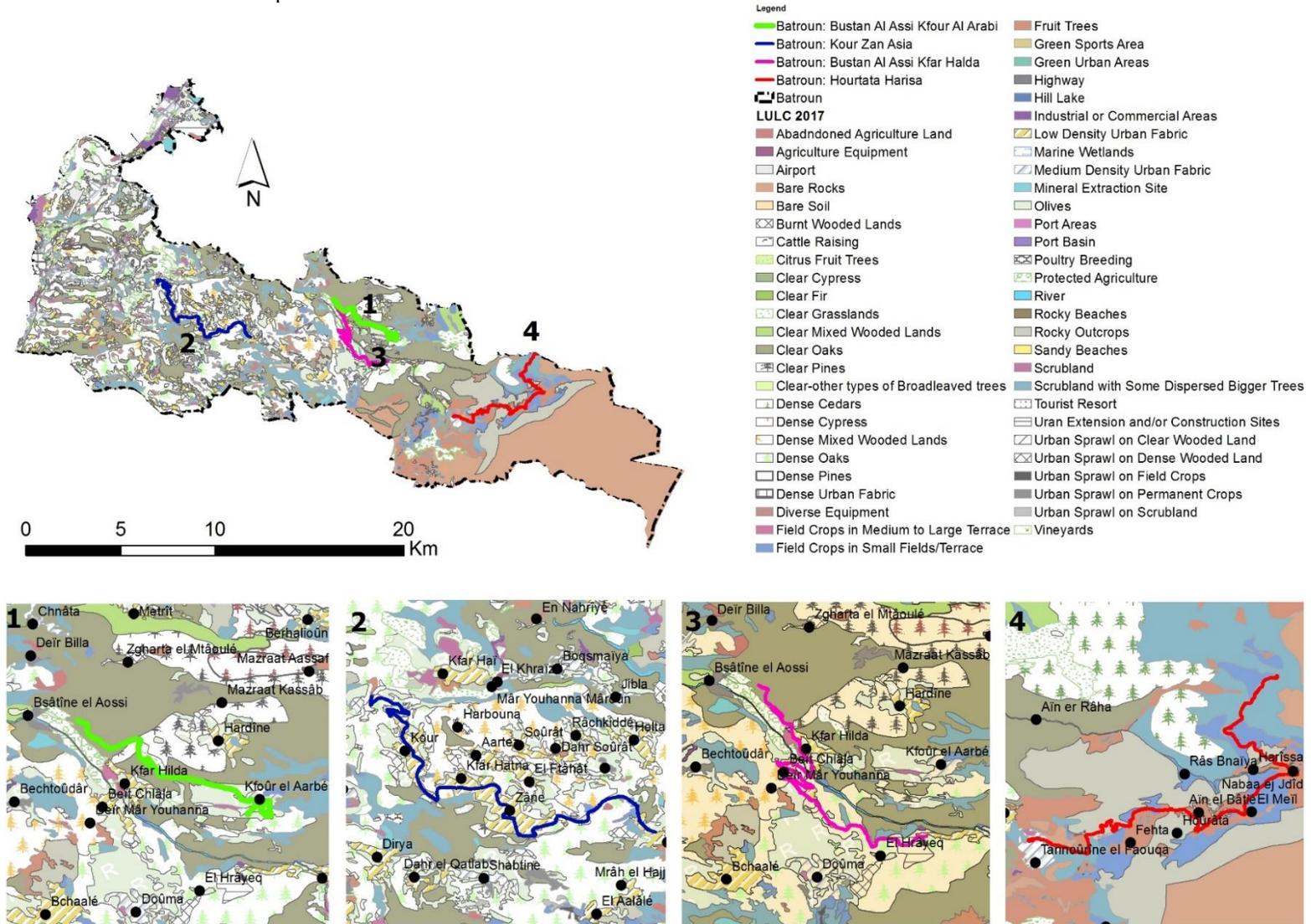
dBA for rural areas. However, as mentioned earlier, the national standards are very stringent and hard to meet along roads. Hence, it is more realistic to consider the FHWA (1997) noise criterion of 67 dBA for residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas, recreational areas, playgrounds, parks.

4.1.6 Land use land cover

The land use and land cover in an area refers to both natural landscape and anthropogenic activities occupying the regions. The four proposed roads in the Batroun Caza pass largely through rural areas. Figure 4-16 shows the main land use land covers of the Batroun Caza as well as those in the immediate vicinity of the 4 proposed roads. Table 4-3 summarizes the main land use land cover within 50 m of the four proposed roads in the Batroun Caza. The roads generally cross through cleared forests as well as agricultural fields, especially olive groves. Both Road 6 (Kour Zan Asia) and Road 5 (Bustan Al Assi Kfar Halda Beit Chelala) cross through dense oak and mixed forests (Figure 4-16).

The field survey revealed a varying terrestrial cover in the vicinity of the various roads. Along Road 4 (Hourata Harisa), the vegetative cover becomes sparse and intermittent due to high elevations. Road 5 (Bustan Al Assi Kfar Halda Beit Chelala) crosses a vegetated area (Figure 4-17) that also includes agricultural activities along the Jaouz River. Meanwhile, Road 7N (Bassateen Al Ossi-Kfour Al Arabi) passes through pine (Figure 4-18) and olive groves (Figure 4-19). Finally, Road 6 (Kour Zan Asia) showed a variation in its vegetative cover, including shrubs, pine, oak (Figure 4-20) due to the large difference in its elevations. Refer to Section 4.2 for more details on the biological environment.

Figure 4-16. Land use and land cover map of selected roads at Batroun Caza



Source: CNRS 2017 LULC map

Table 4-3. Main land use land cover areas along proposed roads in the Batroun district (within 50 meters)

<i>Road</i>	<i>Landuse</i>	<i>Area (m²)</i>	<i>Percent of area per road (%)</i>
<i>Road 7: Bustan Al Assi Kfour Al Arabi</i>	Clear Grasslands	9126	1.5
	Clear Oaks	330,337	52.7
	Clear Pines	36,689	5.8
	Medium Density Urban Fabric	118,724	18.9
	Olives	131,252	20.9
	Scrubland	1,119	0.2
	<i>Total</i>	<i>627,247</i>	<i>100.0</i>
<i>Road 6: Kour Zan Asia</i>	Clear Oaks	31,433	2.9
	Dense Mixed Wooded Lands	43,491	4.0
	Dense Oaks	250,577	23.0
	Diverse Equipment	9,819	0.9
	Field Crops in Small Fields/Terrace	50,703	4.6
	Fruit Trees	65	0.0
	Low Density Urban Fabric	557,896	51.2
	Olives	120,454	11.0
	Scrubland with Some Dispersed Bigger Trees	3,566	0.3
	Urban Extension and/or Construction Sites	22,560	2.1
	<i>Total</i>	<i>1,090,564</i>	<i>100.0</i>
<i>Road 5: Bustan Al Assi Kfar Halda</i>	Clear Oaks	128,455	14.2
	Clear Pines	4,828	0.5
	Dense Mixed Wooded Lands	12,098	1.3
	Dense Oaks	223,147	24.7
	Field Crops in Medium to Large Terrace	38,873	4.3
	Low Density Urban Fabric	176,152	19.5
	Olives	197,881	21.9
	Protected Agriculture	29,643	3.3
	River	3,228	0.4
	Scrubland with Some Dispersed Bigger Trees	23,153	2.6
	Urban Extension and/or Construction Sites	60,420	6.7
	Urban Sprawl on Dense Wooded Land	3,547	0.4
	Urban Sprawl on Field Crops	797	0.1
	<i>Total</i>	<i>902,222</i>	<i>100.0</i>
<i>Road 4: Hourata Harisa</i>	Bare Rocks	35,832	3.1
	Field Crops in Small Fields/Terrace	288,087	24.6
	Fruit Trees	259,879	22.2
	Low Density Urban Fabric	38,701	3.3
	Medium Density Urban Fabric	55,194	4.7
	Rocky Outcrops	267,633	22.9
	Scrubland with Some Dispersed Bigger Trees	210,731	18.0
	Urban Sprawl on Field Crops	11,902	1.0
	Urban Sprawl on Scrubland	751	0.1
	<i>Total</i>	<i>1,168,710</i>	<i>100.0</i>

Figure 4-17. Reeds and olive trees along Road 5 (Bassaten Al Ossi - Beit Chelala) in Kfar Helda



*Road 5- Kfar Helda (34°13'40.8"N 35°50'15.7"E)
A. Maalouf, A. Chehab, M. (Jan, 2019)*



*Road 5- Kfar Helda (34°13'57.4"N 35°50'08.2"E)
A. Maalouf, A. Chehab, M. (Jan, 2019)*

Figure 4-18. Vegetation (pine trees) at Road 7N (Bassateen Al Ossi Kfour Al Arabi)



*Road 7N- 34°13'54.1"N 35°50'37.0"E
A. Maalouf, A. Chehab, M. (Jan, 2019)*

Figure 4-19. Olive trees on the side of Road 7N (Bassateen Al Ossi Kfour Al Arabi)



*Road 7N- 34°13'36.5"N 35°51'34.2"E
A. Maalouf, A. Chehab, M. (Jan, 2019)*

Figure 4-20. Varying vegetative cover along Road 6 (Kour Zan Asia)



A. Maalouf, A. Chehab, M. (Jan, 2019)

4.2 Biological Environment

As mentioned in the previous section, the roads in the Batroun Caza pass through various land cover types that harbor different habitats. More specifically, Road 5 (Bassaten Al Ossi Kfar Helda Beit Chelala) passes through the Al-Jawz River valley and Road 4 (Hourata Harisa) passes within 500 m from the borders of the Tannourine Cedar Forest Nature Reserve.

4.2.1 Flora

The most predominant natural land cover along Road 7N (Bassateen Al Ossi- Kfour Al Arabi) is clear oaks (Table 4-3). Dense oaks are prevalent along Roads 5 (Bassaten Al Ossi Kfar Helda- Beit Chelala) and 6 (Kour Zan Assia) while scrublands are most predominant along Road 4 (Hourata Harisa). As for agricultural lands, olive groves are predominant along Road 5 and 7N, while fruit trees, mostly apple, are predominant along Road 4.

In the vicinity of Road 5, guarrigue and maquis are identified as a distinct semi-natural habitat commonly found in the Al-Jawz River valley. These represent a shrubland habitat ecosystem within Mediterranean forests, woodlands, and scrub biome. It is often composed of kermes oak, lavender, thyme, and white cistus.

Road 4 passes close the borders of the Tannourine Cedar Forest Nature Reserve. The habitat constitutes a mixed forest dominated by Cedar of Lebanon (*Cedrus libani*), with areas of scrub, rocky canyon and fast flowing stream.

4.2.2 Fauna

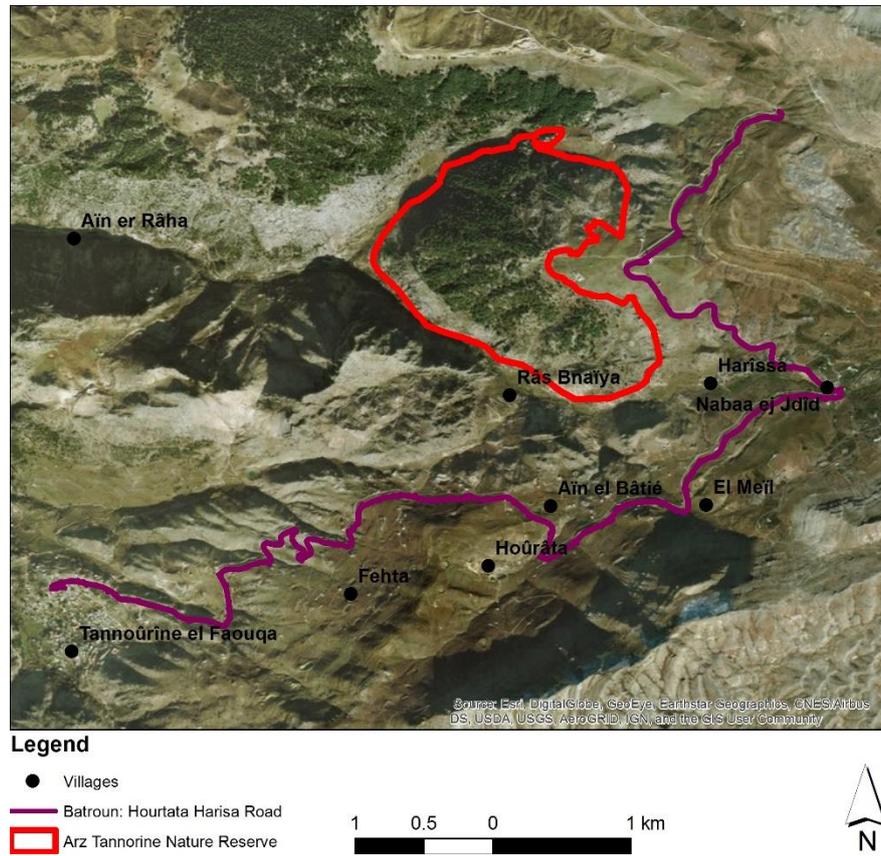
Maquis or shrub-lands remain critically rich ecosystems throughout the country. Due to their density and difficulty of access, they constitute a dynamic hideout for numerous reptiles (the Chameleon (*Chamaeleo chamaeleon*) and the Spur thighed Tortoise (*Testudo graeca*)), mammals, and birds (the Green Finch (*Carduelis chloris*), the Blackbird (*Turdus merula*), the Bee Eater (*Merops apiaster*), and the Masked Shrike (*Lanius nubicus*)). The Tannourine Cedar Forest Nature Reserve site supports a wide range of mammals including Persian Squirrel, Badger, Wild Boar and the rare Wolf. The Reserve has been declared an Important Bird Area (IBA) in 2006. The forest is an attractive resting place for migratory birds. The gorges and mountain sides also are used by eagles, storks and pelicans as they soar on their journeys between Europe and Africa. So far, around 80 species of birds have been identified in the forest (A Rocha, 2007).

4.2.3 Ecologically Sensitive Areas

As mentioned above, Road 4 (Hourata Harisa) passes at a distance of 120 meters from the lower borders of the Tannourine Cedar Forest Nature Reserve, one of the most unspoiled areas in Lebanon

(Figure 4-21). The predominant fauna and flora in the reserve were described in Sections 4.2.1 and 4.2.2 above.

Figure 4-21. Proximity of Road 4 (Hourata Harisa) to Tannourine nature reserve



4.3 Socio-economic Environment

4.3.1 Demographic Profile

The proposed four roads in Batroun pass serve several villages in the Caza, as illustrated in Figure 3-1. Note that no demographic data was readily available on a village basis. However, since the roads are scattered throughout the Batroun Caza, demographic data for the whole caza will be used. According to the MOPH (2016), the total population in the Batroun Caza in 2016 was estimated at 45,094. The reported numbers exclude Palestinian camps and Syrian refugees. Around 66 percent of the population is between 15 and 64 years old and 11 percent is aged above 65 years. The average dependency ratio is high, reaching 56.9 percent. The average household in the Batroun caza hosts between 4 and 5 persons. In the Batroun caza, around 93 percent of the young people (age range between 6 and 12 years) are enrolled in schools. Moreover, about 15 percent of the Batroun population, with an age greater than 10 years, are illiterate (JICA, 2018).

As for the total number of officially registered Syrian refugees in the Batroun Caza, it was reported by UNHCR (2018) to be 14,987. No Palestinian camps are present in the Caza. The total number

of officially registered Syrian refugees in the villages in the immediate vicinity to the four roads was estimated at around 2000 (UNHCR, 2018).

4.3.2 Social Activities

Batroun city offers various social outlets and activities including public gardens and parks, public libraries, as well as cultural, commercial, industrial, and educational centers (schools), coastal resorts, hospitals and clinics, restaurants, and religious buildings etc. It offers an environment rich with cultural heritage with people visiting from inside and outside the city. Beyond the coastline, social activities in relevant Batroun villages are relatively limited to in or out of village visits between family or friends, picnics, church visits, periodic municipal or parliamentary elections, or other range of celebrations of births / anniversaries / weddings to condolences in funerals. Larger villages / towns may house a school or a clinic or an NGO. A detailed social survey at the level of each village was not conducted. To the extent available and accessible, data was extracted from reported literature to provide a brief socio-economic overview as outlined below.

4.3.3 Economic Activities

Standard of living refers to the level of wealth, comfort, material goods, and necessities available to a certain socioeconomic class in a country. About half of the residents (45 percent) in the Batroun caza are classified in the intermediate living index category, while 34 percent are classified as low and 21 percent as having high standard of living (CAS/ UNDP/ MOSA, 2004). Furthermore, around 26 percent of the population (12,025 person) in the Batroun Caza is considered under the Lebanese Poverty Line (CAS/ UNDP/ MOSA, 2004).

Socio-economically, the land use reflects on the economic and social fabric of the region as a whole and in the areas surrounding the proposed roads. As evident from the land cover land use map (Figure 4-16) and from Table 4-3, the urban fabric along the roads ranges from low density along roads 4: Hourata Harisa (3 percent), 5: Bassaten Al Ossi Kfar Helda Beit Chelala (19.5 percent) and 6: Kour-Zan Assia (50 percent) to medium density along road 7N: Bassateen Al Ossi Kfour Al Arabi (19 percent). Hence, the urban coverage is highest along Road 6. In terms of agricultural activities, olive groves are predominant along Road 5 (Bassaten Al Ossi Kfar Helda Beit Chelala) and Road 7N (Bassateen Al Ossi Kfour Al Arabi) reaching up to 20 percent of the area within 50 meters of the road. Fruit trees and field crops in small field/ terraces are predominant along Road 4 (Hourata Harisa) constituting up to 47 percent of the area. These are associated with dispersed light agro-industries. Besides a minority of remaining farmers, residents in the overall caza tend to work elsewhere in urban areas along the coastal region with many residing there and visiting their villages in the summer. Evidently, this is the case for most of the Lebanese villages, where income from agriculture is not adequate to maintain livelihood and has become a supplement rather than the main source of living.

The above was further ascertained by the field survey which revealed that Road 4 (Hourata Harisa), which is part of the Bcharre – Tannourine Highway, is sparsely populated except for few scattered residences and restaurants (Figure 4-22). Road 5 (Bassaten Al Ossi Kfar Helda Beit Chelala) passes across the Al-Jaouz River and has an agricultural nature with many residences scattered throughout the valley bordering the river (Figure 4-23). Road 7N (Bassateen Al Ossi Kfour Al Arabi) is a secondary road with a village existing at its end (Kfour El Arabi) (Figure 4-24). Finally, Road 6 (Kour Zan Assia) passes through a variety of residences and buildings and has a denser urban fabric than the other proposed roads in this Package. It features commercial, residential, and religious buildings along its sides (Figure 4-25). The figures below ascertain the limited number of sensitive receptors present in close vicinity to the roads.

Figure 4-22. Bcharre – Tannourine Road at Road 4 (Hourata Harisa), with very few shops and residences



*Road 4- Tannourine El Faouqa (34°10'57.7"N 35°54'11.9"E)
A. Maalouf, A. Chehab, M. (Jan, 2019)*

Figure 4-23. Agricultural and residential nature near Road 5 (Bassaten Al Ossi Kfar Helda Beit Chelala)



*Road 5- Kfar Helda (34°13'57.4"N 35°50'08.2"E)
A. Maalouf, A. Chehab, M. (Jan, 2019)*



Road 5-Beit Chlala (34°13'16.0"N 35°50'23.6"E)



*Road 5- 34°13'16.0"N 35°50'23.6"E
A. Maalouf, A. Chehab, M. (Jan, 2019)*

Figure 4-24. Kfour El Arabi village at the end of Road 7N (Bassateen Al Ossi Kfour Al Arabi)



Road 7N- $34^{\circ}13'18.8''N$ $35^{\circ}51'59.0''E$
A. Maalouf, A. Chehab, M. (Jan, 2019)

Figure 4-25. Residential, commercial, and religious buildings along Road 6 (Kour-Zan-Assia)



$(34^{\circ}14'25.8''N$ $35^{\circ}44'05.3''E)$



$(34^{\circ}14'25.8''N$ $35^{\circ}44'05.3''E)$



Zan $(34^{\circ}13'30.0''N$ $35^{\circ}45'16.9''E)$



Zan $(34^{\circ}13'30.0''N$ $35^{\circ}45'16.9''E)$

A. Maalouf, A. Chehab, M. (Jan, 2019)

The concerned villages include three public schools (Kfarhaldia Mixed Public School, Tannourine Secondary Public School, and Tannourine El Fawqa Mixed Public School), two primary healthcare centers (Kfour al Arabi and Zan) and the Tannourine Government Hospital. None of these schools and health centers are located directly on the roads to be rehabilitated. The Tannourine Governmental Hospital is located at around 300 meters from the end of Road 5.

There are no sites of cultural heritage significance that are located directly along the proposed roads.

Finally, the current average daily traffic (ADT) for the four proposed roads is summarized in Table 4-4. Traffic on these roads is considered low, with Road 4 exhibiting the highest ADT of 3162 vehicles per day, and Road 6 showing the lowest ADT of 302 vehicles per day in both directions. The relatively higher traffic on Road 4 may be attributed to its connection to the Bcharreh-Tannourine highway, linking the Batroun and Bcharreh cazas together.

Table 4-4. Traffic indicators for Batroun district proposed roads

<i>Road code and villages</i>	<i>Existing Traffic Volume (ADT)</i>	<i>Vehicle Fleet Composition</i>	<i>Vehicle Speed (kms/hr)</i>
<i>Batroun Road 4 Hourata-Harisa</i>	3,162	97% light vehicles 2 % Medium 1% Heavy	50
<i>Batroun Road 5 Bassaten Al Ossi – Kfar Helda- Beit Chelala</i>	1,216	96% light vehicles 3.5 % Medium 0.5% Heavy	50
<i>Batroun Road 6 Kour-Zan-Assia</i>	305	97.5% light vehicles 2 % Medium 0.5% Heavy	50
<i>Batroun Road 7 Bassateen Al Ossi- Kfour Al Arabi</i>	179	93.5% light vehicles 6 % Medium 0.5% Heavy	50

5 POTENTIAL ENVIRONMENTAL & SOCIAL IMPACTS

This chapter describes the environmental and social impacts that are likely to result from the rehabilitation of the roads. Due to the rehabilitation nature of the activities, the anticipated negative environmental and social impacts are expected to be minor to moderate during the rehabilitation phase and of temporary nature including dust, noise, waste generation, disruption to traffic and movement and possible damage to existing utilities; and of little consequence during the long-term operational phase. Such impacts can be minimized by implementing the environmental and social management plan.

5.1 Assessment methodology

The process of impact assessment is undertaken taking into consideration direct, indirect, planned or unplanned (accidental) impacts during the Project's rehabilitation and operation phases. Identified potential impacts are assessed for overall significance based on consequence and likelihood ranking where the impact significance is expressed as the product of the consequence and likelihood of occurrence of the activity as outlined below.

$$\text{Significance} = \text{Consequence} \times \text{Likelihood}$$

Where "Consequence" is the resultant effect (positive or negative) of an activity's interaction with the legal, natural and/or socio-economic environments. "Likelihood" is the possibility that an impact will occur.

The assignment of the level of consequence and potential likelihood depends on the professional experience and judgment of the study team. This judgement followed the consequence categories defined in Table 5-1. The potential overall consequence is then combined with the "Likelihood" to give the impact significance as presented in Table 5-2, which illustrates the likelihood scores and the resulting significance based on consequence-likelihood interaction.

Table 5-1. Consequence scores

<i>Consequence Score</i>	<i>From Planned Activities</i>	<i>From Unplanned/ Accidental Activities</i>
5 <i>(Severe)</i>	Severe environmental damage or severe nuisance extending over a large area and continuous emission or permanent change over more than 5 years. Likely major breach in compliance resulting in prosecution. Stakeholders concern is triggered on an international level.	Certain (event likely to occur more than once on the facility)
4 <i>(High)</i>	Continuous emission or permanent change over less than 5 years leading to a major impact. Possible major regulatory noncompliance. Stakeholders concern is triggered on a national level.	Possible (could occur within the lifetime of the development)
3 <i>(Medium)</i>	Regular over short-term (less than 3 years) or intermittent over long-term (more than 3 years) leading to repeated breaches of statutory limit. Spontaneous recovery of limited damage within one year. Possible regulatory noncompliance. Stakeholders concern is triggered on a regional level.	Unlikely (event could occur within the life of 10 similar facilities, has occurred at similar facilities)
2 <i>(Low)</i>	Minor magnitude effect on the environment but no permanent effect. Regulatory terms or corporate policy set defined conditions. Stakeholders concern is triggered on a local level.	Remote (similar event has occurred somewhere with similar projects but not likely to occur with current practices and procedures)
1 <i>(Negligible)</i>	Local environmental damage within the fence and within systems with negligible severity. No specific statutory control. Stakeholders concern is triggered on an individual level.	Extremely remote (has never occurred within similar projects but theoretically possibly)
0 <i>(None)</i>	No impact.	-
+ <i>(Positive)</i>	Beneficial impact that enhances the environment. No public interest or improves aspect of community importance.	-

5.3.2 *Air quality*

During the rehabilitation phase, air quality can be negatively affected, mainly due to emissions from the on-site usage of construction equipment and to particulate matter released as a result of shallow excavation and leveling works, transport vehicles delivering construction materials, and disturbances to material stockpiles by local winds and material handling.

Road rehabilitation in general is a source of dust emissions that may have temporary adverse impacts on local air quality. Dust emissions often vary substantially from day to day, depending on the level of activity, the specific operations, and the prevailing meteorological conditions. For this phase, it is expected that negative impacts on air quality will occur in and around the immediate locality of the site under rehabilitation. However, dust emissions are not expected to be significant, especially that excavation activities are limited to 20 to 40 cm. In order to quantify this impact, construction emissions and corresponding ambient particulate matter levels can be estimated using simple models (Annex A). Results showed that the predicted total PM concentration at a road segment site is expected to range between 32.8 $\mu\text{g}/\text{m}^3$ under typical conditions, and 15,515 $\mu\text{g}/\text{m}^3$ under worst-case conditions. Hence, under typical conditions, the expected PM concentrations are below the national 24-hr standard (120 $\mu\text{g}/\text{m}^3$) within a 100 m wide corridor. As for worst-case conditions, the expected PM concentrations significantly exceed the national 24-hr standard. Hence, given the open nature of the land cover bordering the roads thus favoring dilution, as well as the limited number of sensitive receptors directly along those roads (mostly along Road 6), the significance of such an impact is considered to be low. Furthermore, as stated, such an impact is temporary and can be minimized with proper management measures are adopted as outlined below.

In agricultural areas such as Kfar Helda and Bsatine el Ossi, emissions from construction equipment and excavation activities may deposit on nearby plants and vegetation along the road, causing a reduction in pigmentation in plant leaves at times, which could affect photosynthesis and plant growth rate. However, as mentioned above, dust emission rates are expected to be low, since road excavations are limited to 20-40 cm in depth. Furthermore, since these emissions are at ground level, large dust particles are not expected to be transported very far from the roads.

The overall impact on air quality during construction is temporary in nature and expected to be of low consequence. Hence, its significance is considered to be minor.

5.3.3 *Noise*

The use of heavy machinery during rehabilitation increases noise levels which may create stress on local inhabitants, workers, and tourists in the close vicinity to road works. Noise from construction is different from noise from other sources because it is caused by many types of equipment, and

the resulting adverse effects are temporary since construction activities are relatively short term. In order to assess the extent of potential noise impacts during the construction of the proposed project, a noise model specific for construction operations can be applied (Annex B). The total L_{eq} for the site was estimated at 80.8 dBA. This noise level is slightly above the maximum noise levels measured in the vicinity of the site (55-80 dBA). It exceeds the FHWA standards for the Category B classified areas (67 dBA). However, this value was 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. The simulated noise levels at different radii away from the site indicated clearly that the daytime Lebanese standard for rural areas (30-40 dBA) will not be reached even at a radius of 2 km from the construction area. As for the FHWA standard, it is reached at a radius of 305 m. As such, residential units in the vicinity of the site will experience temporary periods of high noise levels, typical of any construction activity. The area that may be potentially impacted would typically be limited to a 305 m wide corridor along a road. Few sensitive receptors (residences, churches, Tannourine Government Hospital) might be affected temporarily. The fauna and flora at the Tannourine Nature Reserve in the vicinity of Road 4 (Hourata Harisa) might also be temporarily impacted (Refer to section 5.3.4 on Biodiversity).

The likelihood of occurrence of this impact is considered to be 'certain' and its consequence is 'low' since it is temporary, intermittent and since few sensitive receptors are found along most roads. Accordingly, the significance of this impact is considered as moderate.

5.3.4 Biodiversity

Given that the project activities are limited to the rehabilitation of existing roads and do not include establishing new roads or road widening, direct negative effects on wildlife include the creation of a variety of emissions and disturbances such as noise, dust, light, and pollutants in the soil and vegetation. However, these impacts are temporary in nature and can be easily mitigated.

In fact, studies have shown that dust particles reduce the pigmentation in plant leaves (affect photosynthesis and growth rate of plants) and dust fall on open lands reduces their fertility (Supe et al, 2013). Similarly, noise from construction equipment influence animal behavior, altering activity patterns, and can cause stress, loss of reproductive success, and physiological disturbance. Normally, some animals may vacate the area, while, others may get used to the noise, depending on the species.

Impact on biodiversity is expected to be the most significant along Road 5 and Road 6 where they cross through dense oak and mixed forests as well as along Road 4, in the vicinity of the Tannourine Cedar Reserve. Accordingly, the likelihood of occurrence of this impact is considered to be

‘possible’ and its consequence is ‘medium’ since it is temporary, and intermittent in nature. Hence, the overall impact on biodiversity is expected to be of moderate significance.

5.3.5 Construction and excavation waste

Waste generation is closely associated with the rehabilitation phase of the project. The generated wastes will result from the excavation and ground cleaning activities. The estimated volume of spoil to be generated is around 13,500 m³ composed mainly of asphalt, limestone, dolomite rock, and residual soils. Other wastes that will arise as a normal part of extensive construction works include metals, plastics, packaging material, drilling mud, and blasting wastes. The potential viable options for reuse and disposal of such materials are discussed in the mitigation plan. Improper disposal of solid wastes from construction activities can potentially lead to the contamination of soils and watercourses. This impact’s likelihood is ‘certain’ and its consequence is “medium”, resulting in a “major” impact that requires adequate mitigation.

5.3.6 Water and soil quality

During the rehabilitation phase, runoff from site working areas may contain significant amounts of suspended particles and contaminants. Potential water pollution sources from construction activities include: runoff and erosion from site surfaces, drainage channels, earth working areas and stockpiles; wash water from dust control; in addition to fuel, oil, solvents and lubricants from maintenance of construction machinery and equipment, in case of improper or careless handling. Runoff containing significant amounts of asphalt and cement–derived material may cause primary chemical and physical effects such as increasing turbidity, change in color, and elevation in pH. Domestic sewage from construction workers is not expected to cause negative impacts since, as mentioned earlier, the Contractor will be encouraged to hire labor from the local community living in the Project area. In case this option is not available at the time of hiring, the Contractor will be required to rent an apartment for the unskilled workers in the Project area. In addition, the Contractor will have to service the on-site with portable cabin toilet. The porta cabin will be mobile and its placement depends on the length of the work zone. Accordingly, the Contractor will have to move it based on the progress of rehabilitation works. The Contractor should link the porta cabin toilet to the existing wastewater network. In case the network is not available within the work zone, the Contractor will need to link it to a polyethylene storage tank and the Supervising Consultant shall inspect it on a regular basis and ensure emptying the tank when filled into the nearest wastewater network. This impact is considered to have a ‘possible’ likelihood and a ‘medium’ consequence, resulting in a ‘moderate’ significance.

5.3.7 Resources consumption

The rehabilitation of the roads will require both fill and construction material as well as water. Table 5-3 provides an estimation of the quantities of material needed for the four roads.

Table 5-3. Estimated quantities of construction material based on the preliminary engineering design

Road	Villages	Construction Material needed			
		Reinforced Concrete (m ³)	Reinforcing Steel (tonne)	Crushed Aggregate Base Course (m ³)	Asphalt Concrete (m ³)
Road 4	Hourata-Harisa	200	20	6,413	4,300
Road 5	Beit Shlala- Kfar Halda	60	6	1,504	1,200
Road 6	Kour - Zan - Asia	150	15	4,100	2,900
Road 7N	Kfour AlArabi	100	10	816	1,300
Total		510	51	12,833	9,700

Since the excavated material will not suffice for backfilling, additional amount of fill and other construction material will be needed. This will be mainly obtained from permitted/licensed quarries. Quarrying has a multitude of impacts such as landscape scarring, degradation of existing ecosystems, creation of holes and open craters that pose health and safety hazards, emissions (dust, noise, and vibrations), and transport of uncovered material which can pose hazard to road users. As for freshwater, it will be used for construction activities (curing of concrete, moisturizing temporary stockpiles, etc.) and for cleaning and dust suppression. Water consumption varies with constructional activities, number of workers per day, working days per year, etc. Although construction activities will consume moderate volumes of water, it will only be for a relatively short, finite period.

During the rehabilitation phase, total pavement reconstruction will require the use of several construction vehicles and equipment. According to (Salem et al., 2014), activities such as total asphalt reconstruction and pavement milling and overlay require an average of 73.81 MJ and 26.56 MJ of energy respectively per square meter of rehabilitated road. Table 5-4 presents an estimate of average energy consumption per proposed road assuming all the roads will require total asphalt construction. The total estimated energy consumption ranges between 11.9 and 16.7 x 10⁶ MJ. The energy used during construction will contribute to the depletion of fossil fuel resources. However, the rehabilitation phase will be relatively short-term.

Table 5-4. Average energy consumption for total asphalt rehabilitation per road

Road Code	Villages	Length (Km)	Width (m)	Surface area (m ²)	Energy consumption (MJoules)
Road 4	Hourata-Harisa	10.98	5 - 7	54900 - 76860	4052169 - 5673037
Road 5	Beit Shlala- Kfar Halda	5.11	5 - 7	25550 - 35770	1885846 - 2640184
Road 6	Kour - Zan - Asia	10.32	5 - 7	51600 - 72240	3808596 - 5332034
Road 7N	Kfour AlArabi	6.02	5 - 7	30100 - 42140	2221681 - 3110353

This impact is considered as ‘certain’ to occur and of ‘low’ consequence, hence an impact of ‘moderate’ significance.

5.3.8 Existing infrastructure

Infrastructure such as water and sewage networks, telephone lines, and underground cables often exist under the road pavement. Random digging and milling of deteriorated road pavement, without prior investigation of possible existence of underground infrastructure, may interfere with existing infrastructure that is possibly serving nearby residents. Damage to infrastructure can cause several undesirable impacts such as cutting off water or internet supply, generation of bad smells, and attraction of water borne diseases and vectors due contaminated water accumulation etc. This impact is considered as ‘likely’ to occur and of ‘medium’ consequence, hence an impact of ‘minor’ significance.

5.3.9 Landscape and visual intrusion

Visual intrusion at working sites is expected during the rehabilitation phase. In addition to soil erosion, excavation activities may result in the depletion of the vegetative cover on the side roads and an evident visual impact on the landscape. However, these impacts are expected to be minimal and temporary since the existing condition of the proposed roads does not require significant reconstruction work. Accordingly, the likelihood of occurrence of this impact is considered as ‘possible’ with a ‘low’ consequence, resulting in impacts of minor significance.

5.4 Potential Socio-economic impacts

During the rehabilitation phase. the proposed project will undoubtedly contribute positively from a socio-economic perspective through the creation of job opportunities and the investment in the road infrastructure. This impact is considered as ‘certain’ to occur with ‘medium’ significance and hence is considered a ‘moderate’ positive impact. Concurrently, this phase can be associated with several potentially negative impacts of temporary nature as outlined below.

5.4.1 Social tensions

Potential social tensions and conflict over jobs or dissatisfaction with the allocation of project-generated jobs can often occur if not properly managed, leading to negative publicity, delays, political interferences as well as potential discrimination or harassment. This impact is considered as ‘possible’ to occur with ‘medium’ significance and hence is considered a ‘moderate’ impact.

5.4.2 Child labor

Child labor is common occurrence amongst refugee and poor communities often resulting in a high potential for abuse and exploitation. While Lebanese law allows child work starting at the age of

13 under certain very specific and well controlled conditions, provisions under the mitigation / management plan will protect against child labor preventing its occurrence under this project through a transparent hiring process that maintains a registry of verification about work permits and age. This impact will not be allowed to happen with the proper implementation and monitoring of the verification process in place.

5.4.3 Labor influx

Contractors are expected to be sensitive to hire locally first both Lebanese and Syrians. Influx of additional labor is not expected because the Syrian workforce is already present in the area in good numbers. This labor influx may induce Sexual Abuse and Exploitation and Harassment (SEA/H). In the event contractors bring in additional workers from outside the area (with proper justification such as the lack of certain technical field workers), training and raising awareness activities coupled with the code of conduct stipulated under the management plan will help integrate the additional workers. This impact is considered as ‘possible’ to occur with ‘medium’ significance and hence is considered a ‘moderate’ impact.

5.4.4 Access to services

Access to roadside businesses (such as stores, gasoline stations), farmlands and recreational facilities, as well as access to roadside residences can be limited inducing extra inconvenience. In particular, the rehabilitation of roads may restrict the accessibility of few private buildings especially along Road 6: Kour Zan Assia (Figure 4-23). While the expected rehabilitation period per district is about 15 to 18 months according to CDR, the few sensitive construction along the roads will experience a short construction period along small stretches that do not require beyond a few days of construction. This impact is considered as ‘possible’ to occur with ‘medium’ significance and hence is considered a ‘moderate’ impact.

5.4.5 Health and safety impacts

Health and safety at construction sites are considered primarily in terms of potential exposure and accident occurrence (direct and indirect) to workers on-site, pedestrians, and vehicle operators or passengers. Construction activities pose potential risk on the safety of workers as well as the general public either through the possible danger from passing traffic or negligence-careless use of heavy equipment. Common causes of fatalities and serious injuries among workers include, pedestrian workers struck by passing traffic, by construction machinery, or by objects (tools, materials, parts of equipment, trees, etc.), equipment / vehicle rollovers, falls, overexertion, etc. Similarly, pedestrian passers-by may be at risk of injury getting struck by construction machinery or by objects. Passing traffic may also be at risk of accidents if not aware of presence construction site and road detours. This impact is considered as ‘possible’ to occur and of ‘medium’ consequence, hence an impact of ‘moderate’ significance.

5.4.6 Traffic disturbance

Increased travel times during the rehabilitation phase are expected and translates into inconvenience to the public and potential economic losses in the form of delays and forgone earnings. While the overall expected construction period per district is about 15 to 18 months according to CDR, the few sensitive locations along the roads will experience a shorter construction period with stretches that are relatively short and do not require beyond a few days of construction. This impact is considered as 'possible' to occur with 'medium' significance and hence is considered a 'moderate' impact.

5.5 Potential positive impacts during the operation phase

The REP is expected to have positive impacts on socio-economics and several environmental indicators (traffic; air quality; noise; visual intrusion; health and safety) as described below. Note that most indicators may exhibit both minor negative impacts as well depending on how they are examined.

5.5.1 Traffic and air quality

Improved traffic flow on rehabilitated roads will lead to improved fuel efficiency and better engine performance, thereby reducing vehicle emissions.

5.5.2 Landscape and visual intrusion

During operation, the impact is expected to be positive as the roads will be refurbished and will have an improved appearance.

5.5.3 Health and safety impacts

During operation, it is expected that, with proper rehabilitation and signage, the roads can be safer with less potential for accidents. Proper traffic management can reduce road safety risks.

5.5.4 Socio-economics

During operation, improved road conditions will improve accessibility of people, goods and services. This will lead to an improvement in local economic and social development and enhanced livelihood opportunities in the remote rural areas the roads are servicing, due to reduced trip times and less traffic congestion. Furthermore, the enhanced safety design of the rehabilitated roads will result in a reduction in traffic accidents. In addition, smoother road surfaces may lead to fewer vehicle repairs thereby resulting in longer vehicle life and lower maintenance expenditures.

5.6 Potential negative impacts during the operation phase

5.6.1 Air quality

During the operation phase, vehicle emission factors will be a function of the expected traffic conditions along the roads as well as the general characteristics of the vehicle fleet. Moreover, traffic redistribution will influence the exposure of residents to vehicular emissions. In the long term, improved road conditions will increase traffic volume through the road and result in increased pollutants emissions from vehicles. On the other hand, improved traffic flow leads to improved fuel efficiency and better engine performance, thereby reducing vehicle emissions. Hence the net impact could be slightly positive or slightly negative.

Table 5-5 presents the projected traffic volume on the proposed roads in 20 years. It is important to note that the increase in future flow, which amounts to around 81 percent, is attributed mostly to population growth. It is difficult to quantitate the contribution of the REP to this increase.

Table 5-5. Projected traffic volume along the Batroun district proposed roads (20 years)

<i>Road code</i>	<i>Villages</i>	<i>Existing Traffic Volume ADT</i>	<i>Future Traffic Volume ADT (20 Years)</i>	<i>Vehicle Fleet Composition</i>
<i>Road 4</i>	<i>Hourata-Harisa</i>	3162	5711	97% light vehicles 2 % Medium 1% Heavy
<i>Road 5</i>	<i>Beit Shlala- Kfar Halda</i>	1216	2196	96% light vehicles 3.5 % Medium 0.5% Heavy
<i>Road 6</i>	<i>Kour - Zan - Asia</i>	305	551	97.5% light vehicles 2 % Medium 0.5% Heavy
<i>Road 7N</i>	<i>Kfour AlArabi</i>	179	323	93.5% light vehicles 6 % Medium 0.5% Heavy

The four roads were simulated using a line source Gaussian plume model (Annex A). The results showed that impacts would be minimal¹⁸; this is mainly due to the relatively low projected traffic volumes, and the high potential for atmospheric dispersion within the project area. The impact on air quality during the operation phase is confined in nature and expected to be of low consequence. Hence, its overall significance is considered to be minor.

5.6.2 Noise

At the operational level, vehicular traffic is the main source of noise emissions. Although the road rehabilitation maintained the existing design speed of 50 km/hr, improved road conditions allow higher traffic speed that can also increase noise levels along the roads. Noise levels are primarily a

¹⁸ The maximum future CO concentration under the worst-case scenario in terms of meteorology was along Road 4, which has the highest projected traffic volume. It was estimated at 65 µg/m³, which is well below the national ambient air quality standard for CO of 10,000 µg/m³ for an 8-hr average.

function of the car fleet characteristics, traffic volume and speed, as well as pavement surface design. A typical methodology to carry a quantitative assessment is outlined in Annex B. The area that may be potentially impacted by noise levels exceeding 67 dBA would typically be limited to a 300 m wide corridor along Road 4, where the future traffic projections are the highest (5,120 vehicle/day). For other roads, the projected increase in traffic is not expected to cause a significant increase in noise level that might reach unacceptable levels. It is important to note that the increase in future flow, is not directly attributed to the project, but will occur naturally due to population growth. It is difficult to quantify the exact contribution of the REP to this increase. Accordingly, the noise impacts during the operation phase will be limited to the immediate buffer region along the road. The occurrence of this impact is considered to be 'likely' and its consequence is 'medium' since it is long-term, but few sensitive receptors are found along most roads. Accordingly, the significance of this impact is considered as minor. Note that in semi-urban areas, noise impacts are expected to be more significant and long term particularly that commercial and residential areas are located in the immediate vicinity of Road 6. These impacts are expected to materialize with increased development of the general area, irrespective of the road rehabilitation project.

5.6.3 Biodiversity

Impacts on biodiversity during the operation phase are expected to be limited as no additional roads are being built. Nevertheless, increase in traffic movement could result in an increase in road kills (i.e. mortality due to vehicular collisions). Animals that are attracted to roads or that need to cross them are more vulnerable. Furthermore, increased artificial night light might affect the natural behavior of many animal species. It can disturb development, activities and hormone-regulated processes, including the internal clock mechanism (Rich and Longcore, 2006). In addition, many species are attracted to, and disoriented by sources of artificial light (phototaxis phenomenon). However, lights won't be installed along all the road length. They will be limited to areas close to residents and areas where road safety warrants lighting. This will minimize the impact of light on biodiversity. Accordingly, the impact on biodiversity quality during the operation phase is expected to be 'likely' and of 'low' consequence. Hence, its overall significance is considered to be minor.

5.6.4 Water and soil quality

During the operational phase, highway runoff can cause contamination to surface and ground waters, but this is relatively insignificant unless associated with a spill. In concept, it is unavoidable to transport hazardous goods (fuel, gasoline, industrial raw materials) on the roads when in operation. Thus, accidents may happen and accidental spills of hazardous materials may cause a serious problem to nearby water bodies as well as groundwater sources. Hence the significance of this impact is considered as minor but not much different than the existing conditions without the project implementation. In fact, it is expected that with proper rehabilitation and signage, the roads can be safer with less potential for accidents.

5.6.5 Resources Consumption

The project will require electrical power for supplying lighting and any traffic signals, if available. In general, the increase in energy demand will contribute to the depletion of fossil fuel resources, as well as to the emissions of greenhouse gas emissions. Water will be utilized for cleaning purposes, however, the required quantities during operation are not expected to contribute to the increase in the demand for water resources. Accordingly, impacts of the consumption of natural resources are considered as moderate for energy and negligible for water.

5.6.6 Visual amenity

Moderate light pollution is expected after improving the street lighting conditions. This might affect project surroundings, considering that some of the existing inhabited surroundings are residential. However, this impact is expected to be minor being 'likely' and of 'medium' significance.

5.6.7 Health and safety impacts

During operation, maintenance activities pose potential risk on the safety of workers as well as the general public either through the possible danger from passing traffic or negligence-careless use of heavy equipment. Furthermore, potential deaths, injuries, and damage to property resulting from car accidents are a public health problem and a cost to the economy but not much different than the existing conditions without the project implementation. In fact, it is expected that with proper rehabilitation and signage, the roads can be safer with less potential for accidents. Proper traffic management can reduce road safety risks. This is considered as 'likely' to occur with a 'medium' consequence, and hence is considered of minor significance.

5.7 Summary of environmental impact analysis

The rehabilitation phase of any development is known to have potential adverse environmental impacts on traffic, air quality, noise level, construction waste, water and soil quality, landscape and visual intrusion, resources consumption, damage to existing utilities, health and safety. Inadequate construction standards can increase environmental degradation. The potential environmental impacts during the construction phase of the project were assessed to range from minor to major negative, with the majority being moderate negative.

During operation, the rehabilitation of the road, combined with the natural increase in the vehicle fleet size, will ultimately increase traffic volume and hence, typical impacts associated with increased traffic will be inevitable in the long term. Yet, improved traffic flow on rehabilitated roads will lead to improved fuel efficiency and better engine performance, thereby reducing vehicle emissions. Refurbished roads will lead to improved landscape and visual intrusion, despite increase in light pollution. Finally, improved safety design of roads can reduce the potential for accidents.

The magnitude and significance of these impacts is not the same along all roads. Based on the field surveys and environmental and social assessment, Road 6 encompasses a more sensitive and diversified environment because it passes close to a variety of residences and buildings and is the most populated amongst all roads in this Package. It features several commercial, residential, and religious buildings along its sides. On the other hand, roads 4 and 5 pass close to sensitive environments from a wildlife perspective (Tannourine Cedar Reserve and Al Jawz River valley).

Table 5-6 summarizes the significance of impacts associated or expected with both the rehabilitation and operation phases. Negative impacts are mostly temporary or not significant in nature with similar size projects.

Table 5-6. Summary of potential impacts of proposed roads in Batroun district

<i>Potential Impact</i>	<i>Rehabilitation phase</i>	<i>Operation phase</i>	
<i>Traffic</i>	Moderate negative	Minor negative to	Positive
<i>Air quality</i>	Minor negative	Minor negative to	Positive
<i>Noise</i>	Moderate negative	Minor negative to	Positive
<i>Biodiversity</i>	Moderate negative	Minor negative	
<i>Construction Waste</i>	Major negative	Neutral	
<i>Soil and water</i>	Moderate negative	Minor negative to Zero	
<i>Resources consumption</i>	Moderate negative	Neutral	
<i>Existing infrastructure</i>	Minor negative	Neutral to Positive	
<i>Visual Intrusion</i>	Minor negative	Minor negative to	Positive
<i>Health and Safety</i>	Moderate negative	Minor negative to	Positive
<i>Socio-Economic</i>	Moderate negative	to Positive	Positive
<i>Archaeology / Cultural Heritage</i>	Neutral	Neutral	
<i>Expropriation/involuntary resettlement</i>	Neutral	Neutral	

5.8 Summary of socio-economic impact assessment

During the rehabilitation phase, the socio-economic impacts are expected to be positive in terms of providing job opportunities and moderately negative in terms of temporary increase in travel time, impeded accessibility to residences / businesses, and potential health and safety and social tensions. During the operation phase, the rehabilitation of roads is expected to have positive impacts by improving access to remote areas, reduced trip times, reduced traffic congestion and accidents, and enhanced livelihood opportunities.

6 MITIGATION OF ENVIRONMENTAL AND SOCIAL IMPACTS

Mitigation measures are typically recommended whenever the potential impact is moderately significant with the ultimate purpose to eliminate or reduce the potential negative impacts of the proposed project. Mitigation measures are highly dependent on the significance of the predicted impact, the nature of the impact (permanent vs. temporary), or the phase of the project (construction vs. operation). Possible measures to mitigate potential impacts described in the previous section are outlined below, particularly during the rehabilitation phase. The operation phase will experience mostly general socio-economic improvements which is the purpose of the project although minor impacts are inevitable such as the increase of noise and vehicle emissions due to traffic increase.

6.1 Environmental Mitigation Measures during Rehabilitation

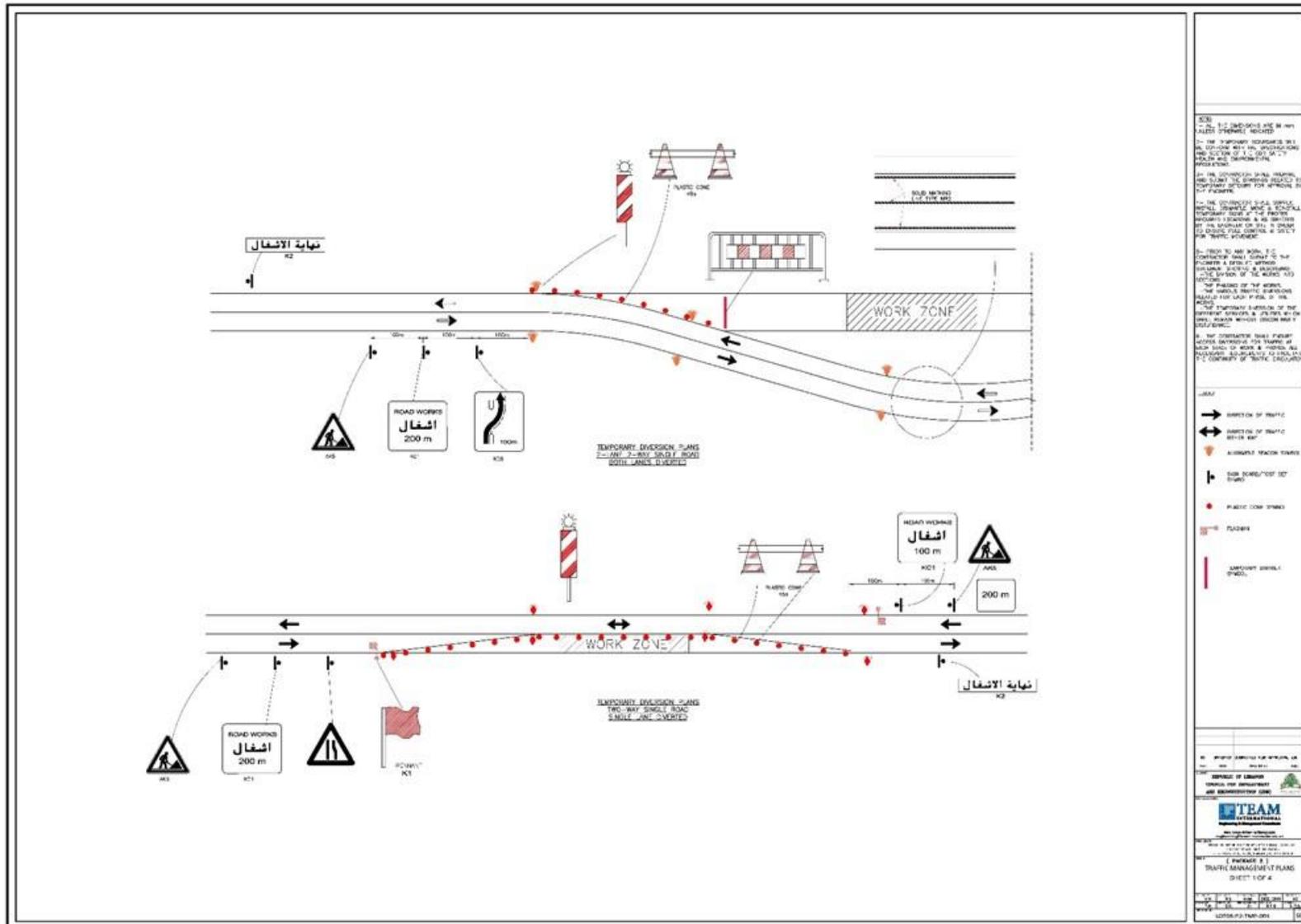
6.1.1 Traffic

Traffic delays and congestions can be avoided by implementing the following mitigation measures:

- ❑ Scheduling transportation of construction material during off -peak traffic hours and during night time. Generally peak traffic hours are from 7 to 10 am and from 3 to 6 pm
- ❑ Developing routing strategies for construction-related traffic to avoid sensitive receptors
- ❑ Informing the public about the schedule of rehabilitation activities
- ❑ Maintaining access to roadside businesses and residences via detours and temporary access features
- ❑ Ensuring adequate warning, signing, delineation and channeling at least 500 m down and up-gradient from the construction site
- ❑ Providing personnel to manage traffic at the rehabilitation site, supported by Municipal police if needed
- ❑ Avoiding peak traffic times when laying asphalt

Detour maps showing traffic management plans along a 2-lane 2-way single road (Figure 6-1) and a dual carriageway road (Figure 6-2) are presented below. Note that the traffic detour options presented in Figures 6-1 and 6-2 can be adopted only when the option is within the right of way of the proposed road.

Figure 6-1. Traffic management plan for a detour along a 2-lane 2-way single road



6.1.2 Air quality

The impact of construction activities on air quality can be reduced by the use of well-maintained equipment as well as by appropriate water spraying for dust control during dry periods. Typical measures include:

- ❑ Ensuring adequate maintenance and repair of construction machinery and vehicles
- ❑ Maintaining good housekeeping practices that entail keeping the site and its surroundings clean
- ❑ Ensuring good quality of diesel fuel used with on-site equipment
- ❑ Turning off all equipment when not in use
- ❑ Sprinkling water on the construction site on windy days to hamper the generation of dust and its entrainment in the wind
- ❑ Ensuring that excavated soil and fine construction material that are stored on site are properly sited away from the dominant wind direction and that they are watered and/or covered entirely by impervious sheeting when not in use
- ❑ Proper handling of cement material
- ❑ Covering all vehicles hauling materials likely to give off excessive dust emissions
- ❑ Ensuring good fuel quality is used in trucks transporting construction material to and from site
- ❑ Ensuring optimum and regular transportation of construction materials to minimize storage of large heaps on-site and to minimize concentrated truck-trips.
- ❑ Restricting vehicle speeds to 25km/h on unpaved roads and trucks

6.1.3 Noise levels

To reduce the impacts of noise from construction activities, possible mitigation measures include the use of quiet equipment and noise mufflers, proper maintenance of equipment, and limiting noisy activities to normal daylight working hours.

6.1.4 Biodiversity

Induced negative impacts of road projects on biodiversity can be minimized by taking special care when passing through rich or critical natural ecosystems (valleys, forests, rivers...etc). Specific mitigation measures include:

- ❑ Careful rehabilitation work must be conducted where the road crosses “Al Jaouz” or passes next to the Tannourine Cedars Reserve in order to avoid damaging the nearby ecosystems.
- ❑ Workers’ movement and activities should not infringe on the nearby ecosystems including agricultural areas.

- ❑ Workers should be instructed to protect flora and fauna when feasible as well as their habitats.
- ❑ Solid and liquid waste should not be dumped into the natural environment (See below).

6.1.5 Construction waste

While waste materials should be properly disposed of at suitable permitted locations to avoid contamination of soils and watercourses, permitted sites for construction waste disposal are rarely available in Lebanon. This is a chronic challenge and a weakness in environmental management throughout the country. As discussed during the public participation session, proper permits should be obtained through local municipalities whereby inert waste materials (excluding asphalt) can be used as filling material for local road reconstruction projects within the caza or disposed of at local sites like quarries only if designated / approved for that purpose. If needed, these sites should be agreed upon between the municipalities, in coordination with the supervising consultant and CDR.

Similarly, lubricant/fuel waste are difficult to manage in Lebanon because of the lack for facilities for this purpose. To avoid damage to the natural environment there is a need to ensure proper handling of fuels, lubricants and other chemicals while maintaining construction equipment and prevent possible leakage of lubricants and fuel during periodic inspection and maintenance of equipment. It is preferable to maintain equipment in dedicated repair shops.

6.1.6 Water and soil quality

The most appropriate mitigation measures to ensure minimal water quality impacts include provisions for proper surface drainage during both the rehabilitation and operation phases, and the minimization of on-site water and chemical usage (oil lubricants and fuel) and soil exposure time during the rehabilitation phase. These wastes when mixed with other construction waste are typically disposed of in open dumps or landfills. In addition, the contractor should adopt the following mitigation measures in order to minimize the effect on soil and water bodies during rehabilitation:

- ❑ Building materials, asphalt, oil and chemicals should be stored away from river banks in well controlled areas
- ❑ Any stockpiled construction material should be covered with an impermeable layer
- ❑ Diesel should be stored in designated tanks away from the road maintenance site and drainage ditches. Tanks are to be put on an elevated concrete base to prevent soil or water pollution in case of accidental spill at the specified storage location
- ❑ All refueling operations shall take place off-site, vehicles should be fueled up before arriving to the road section
- ❑ Each container should be marked with the correct technical name of the substance it contains

- ❑ Incompatible materials shall not be placed in common containment
- ❑ A spill response plan shall be in place and all workers should be trained on its implementation
- ❑ Used or waste fuel or other waste chemicals shall be stored in an isolated area until collected for off-site disposal by an approved waste contractor
- ❑ Waste material or water containing waste chemicals such as thinners, oil, and mineral spirits shall not be pumped or disposed of into storm water drains, sanitary sewers or into the ground.
- ❑ Vehicle and equipment wash-down should only be done in designated areas away from the road under rehabilitation to protect water and soil quality in the area
- ❑ A collection system shall be provided under any machinery or equipment that may leak hydrocarbons (e.g. mobile generator)
- ❑ All operations involving the use of concrete should be carefully controlled to avoid leaching into water sources.
- ❑ Contaminated storm water runoff (due to milling and side ditches excavations) should be diverted and directed to sediment traps (sand chutes, steps, weir, or settling pond if space is available) to remove suspended solids (debris) before discharge into the downstream environment (especially in Al Jaouz river).

More specifically, for soil manipulation the following measures are recommended:

- ❑ Installation of retaining walls before starting with drainage ditch excavations to block soil erosion
- ❑ Excavations for drainage channels should be carried out in complete precision and resulting excavated soil should be stored and transported to offsite locations for disposal due to possible contamination.
- ❑ Reduce the time excavated drainage channels remain unsupported
- ❑ Keep vegetation clearing to a minimum and encourage re-vegetation immediately after construction activity finishes, at sites where vegetation is removed,
- ❑ Place geotextile silt traps as appropriate

Note that the Contractor will have to service the on-site with portable cabin toilet for the workers. The porta cabin will be mobile and its placement depends on the length of the work zone. Accordingly, the Contractor will have to move it based on the progress of rehabilitation works. The Contractor should link the porta cabin toilet to the existing wastewater network. In case the network is not available within the work zone, the Contractor will need to link it to a polyethylene storage tank and the Supervising Consultant shall inspect it on a regular basis and ensure emptying the tank when filled into the nearest wastewater network.

6.1.7 Resources consumption

To mitigate quantities of water consumed, the following mitigation measures are recommended:

- ❑ Dry clean-up methods should replace wet cleaning methods whenever practical (sweeping, dust collection vacuum, wiping...etc.), while taking into consideration dust generation
- ❑ Signs near water-using appliances should be installed to encourage water conservation
- ❑ Appropriate plastic sheeting or waterproof paper should be used to cover the concrete after water curing to preserve moisture and reduce the evaporation that leads to less water quantities used

To mitigate energy consumption:

- ❑ Turn off equipment when not in use
- ❑ Regularly maintain machinery and generators and operate them in an efficient manner
- ❑ Do not leave vehicles idle for long periods
- ❑ Site offices shall be well insulated to retain heat or cool, utilize energy efficient bulbs and energy efficient cooling systems.

To mitigate the use of construction material:

- ❑ Reuse excavated material whenever feasible
- ❑ Accept construction material only from permitted/licensed quarrying sites

6.1.8 Existing infrastructure

To avoid damaging any possible existing infrastructure, road plans and elevation for each road that requires pavement reconstruction, and that should have accounted for the location of the existing utilities, should be obtained from the concerned team and incorporated in the planning prior to commencement of any rehabilitation works. Procedures for rapid notification of the concerned municipality/ ministry, in the case of disruption of any existing utility, should be prepared along, with requirements for immediate assistance with re-instatement, and close follow-up with concerned authorities.

6.1.9 Visual intrusion

To mitigate for visual intrusion, possible measures consist of:

- ❑ Documenting existing conditions prior to initiation of the works
- ❑ Preserving existing vegetation when feasible
- ❑ Restoring depleted vegetative cover by replanting with endemic trees (pine, oak, etc.) where cutting is necessary during rehabilitation.
- ❑ Clearance of all equipment, spoil heaps, and other materials after rehabilitation

6.2 Environmental Mitigation Measures during Operation

6.2.1 Air quality

The long-term impacts from the operation of the road can only be mitigated within the framework of a countrywide plan for air quality, fuel quality and vehicle fleet maintenance, which is beyond the scope of this project.

6.2.2 Noise levels

During the operation of the road, the provision of speed limit signs at critical locations can minimize noise emissions from moving vehicles, particularly in the sections where there are sensitive receptors. Bitumen based noise absorbent material can be added for surfaces on the sections adjacent to residential areas and sensitive receptors (Tannourine Cedar Reserve). Such materials will reduce the noise to the surrounding areas by about 5 dB, compared with other road surfaces. Finally, roads should be periodically and regularly maintained for good working conditions.

6.2.3 Biodiversity

Bird-friendly light sources are recommended on public roads, to decrease the number of casualties among nocturnally migrating birds (Poot et al, 2008) and to disturb less natural vegetation (flowering, seed setting, and germination) and the local fauna (Rich and Longcore 2006). Speed bumps and animal crossing signage are recommended along Road 4 (Hourata Harisa) in the vicinity of the Tannourine Cedars Reserve to minimize road kills of animals moving out of the Reserve.

6.2.4 Water and soil quality

The most appropriate mitigation measures to ensure minimal water quality impacts include maintenance of surface water drainage systems. In addition, vehicles hauling hazardous materials should inform administrative departments, and cannot run on the road unless they get permits. Furthermore, such vehicles should be provided with obvious markings and can stop only at designated locations.

6.2.5 Resource consumption

In order to mitigate resource consumption during the operation phase, consider:

- ❑ Using water-efficient equipment during maintenance operations to avoid excessive and overuse of water

6.2.6 Visual intrusion

In order to mitigate light pollution during the operation phase, consider:

- ❑ Choosing a type of light that is least likely to cause light pollution

- Ensuring that the light source is has the minimum intensity required
- Ensuring that lights are turned off when not needed (manually or automatically)

6.2.7 Health and safety

During road maintenance activities, the contractor will be required to comply with the standard safety, health and environmental regulations of the CDR and the WB. These regulations include measures for providing pedestrian walk ways, installing proper warning signs, providing protective clothing and equipment. The guidelines will be included within the bid specifications and maintenance contracts. The supervising consultant will have the responsibility of ensuring the implementation of these guidelines. As for mitigating road accidents, proper road management, road maintenance, and signage coupled with speed control and enforcement of international road safety standards and practices can reduce accidents.

6.3 Socio-economic Mitigation Measures During Rehabilitation

As indicated above, while the proposed project will create some positive socio-economic impacts through job opportunities and investment in infrastructure, several potential negative impacts that are temporary in nature, were identified in the impact assessment and require attention in the mitigation plan as outlined below.

6.3.1 Social tensions

in order to avoid the risk of social tensions and conflict over job-sharing / dissatisfaction with allocation of project generated jobs, it is recommended to develop and communicate clear criteria for job selection and allocation, with attention to ratio of Syrian and Lebanese community workers, non-discrimination and fair treatment of all workers including equal wages/benefits and working conditions, types of positions and jobs restricted to Lebanese citizens, and consideration also for sub-group allocations within different communities.

Employment opportunities were discussed during the consultation process for both Lebanese and Syrian workers. The latter contributes significantly in the construction sector throughout Lebanon including the Batroun District. Besides private entities, the municipalities are resorting to Syrian labor in this sector in particular. There appears to be a clear split in job types between the two communities. The delineation line is between skilled jobs (mainly taken by the Lebanese workforce) and unskilled labor (filled primarily by Syrian workers). This split has resulted in a control of potential tensions or conflict between the communities.

A grievance mechanism is established by the CDR for the public to file their complaints particularly during the rehabilitation phase. The effectiveness of this mechanism is ensured when public

complaints are closely monitored and can reach multiple stakeholders simultaneously including the contractor, supervising consultant, PIU at CDR, the local relevant municipalities, and workers. The GRM is applicable for communities and for workers (both Lebanese and Syrian workers) with the option to remain anonymous when filing a grievance to encourage complainers to speak out without potential fear of repercussions. Close monitoring of complaints is imperative alongside a transparent documentation process of timely response undertaken.

6.3.2 Child labor

Child labor under this project will not be allowed through a transparent hiring process that maintains a registry of verification about work permits and age. Particular attention is essential to prevent child labor by maintaining and monitoring a labor registry for age verification process prior to hiring potential workers.

6.3.3 Labor influx

While labor influx from outside the region is not expected because the local workforce seems to be available according to the municipalities, training and raising awareness are necessary including a well-defined and distributed code of conduct for of workers. Contractors are expected to be sensitive to hire locally first both Lebanese and Syrians. In the event contractors bring in additional workers from outside the area (with proper justification such as the lack of certain technical field workers), training and raising awareness activities coupled with the code of conduct stipulated under the management plan will help integrate the additional workers. Moreover, the Contractor should give workers training and awareness sessions on SEA/H to prevent and eliminate all forms of violence against women and girls.

6.3.4 Access to services

Being temporary in nature, the impacts on residents can be minimized by providing alternative access to residences and roadside businesses and shortening the construction period by making financial resources readily available to contractors coupled with penalty and incentive clauses in the contract.

6.3.5 Health and safety impacts

Proper mitigation measures can significantly reduce health and safety risks during the rehabilitation phase. The CDR has developed site health and safety guidelines for contractors (Annex C) involved in construction projects. The contractor will be required to comply with these guidelines as well as the WB guidelines which include measures for providing pedestrian walk ways, installing proper warning signs, providing protective clothing and equipment. Contractors will equally be obliged to maintain a site construction insurance plan that covers all workers in case of injury or accidents

during construction. The guidelines will be included within the bid specifications and construction contracts. The supervising consultant will have the responsibility of ensuring the implementation of these guidelines. During operation, proper road management, signage and maintenance can prevent or reduce accidents.

6.3.6 Traffic disturbance

During the rehabilitation phase, the impacts of increased travel times can be minimized by providing alternative access to residences and roadside businesses and by adopting traffic management plans to ensure a safe and efficient movement of traffic during rehabilitation (Refer to 6.1.1 on mitigation of traffic delays during rehabilitation) as well as by informing the public about the schedule of construction activities. It is also preferable that the road rehabilitation be implemented outside the summer season in areas where villagers depend on summer businesses.

6.4 Social Mitigation Measures During Operation

Since no negative socio-economic impacts were identified during the operation phase, no mitigation measures are needed.

7 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

7.1 Institutional Setup and Capacity Building

7.1.1 National Institutions

Effective mitigation and monitoring plans require the presence of adequate capacity for environmental management at the national level. For the REP, the CDR plays a major role in ensuring the implementation of environmental mitigations by:

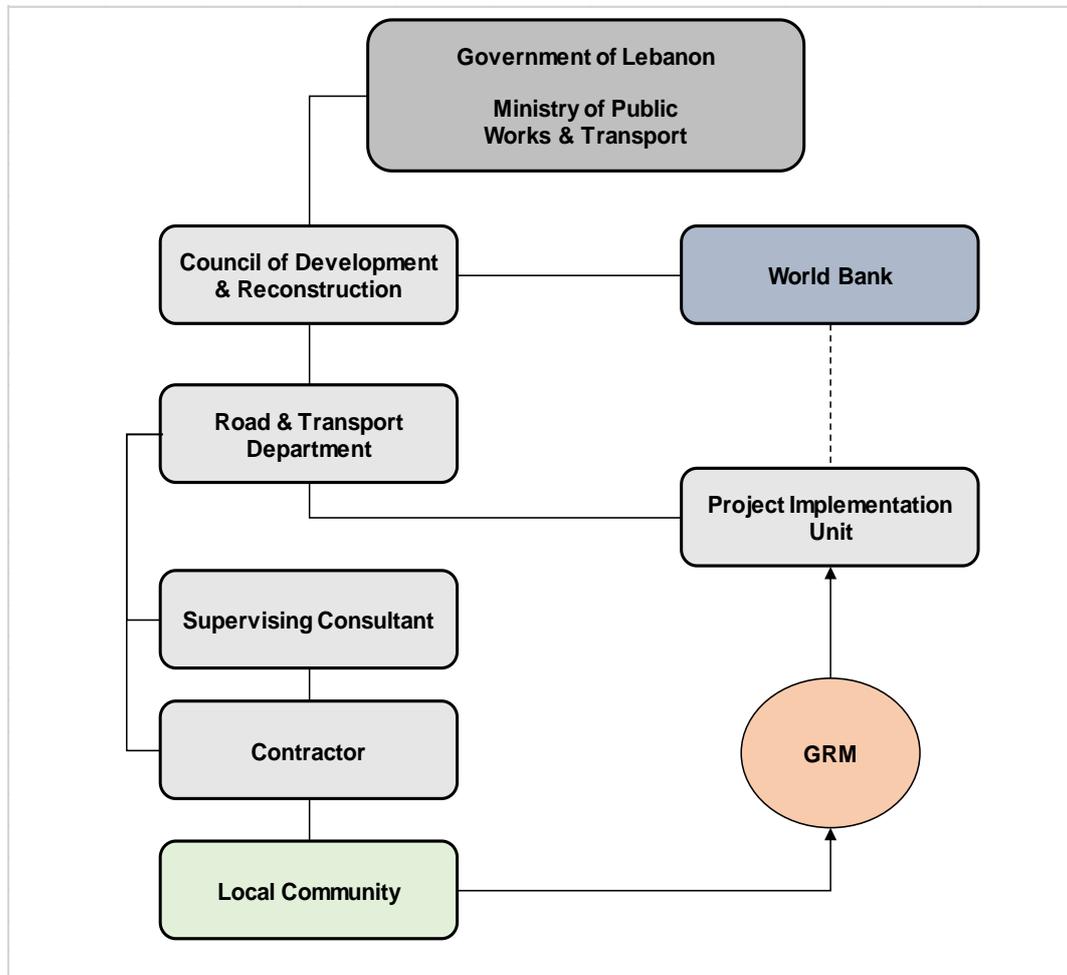
- ❑ Supervising design works at the design stage and ensuring that contracts for design works bear clauses requiring Design Teams to plan for and allocate resources for impact mitigation.
- ❑ Ensuring that ESMPs are integrated wholly into design reports.
- ❑ Ensuring that Technical Specifications of Contracts for Civil works will bear clauses binding respective contractors to undertake impact mitigation as per the Design Report, in line with the World Bank Safeguards Procedures for Inclusion in the Technical Specifications of Contracts
- ❑ Monitoring activities of contractors to ensure delivery as per contracts through its field officers and mainly through dedicated supervision consultants

The Project Implementation Unit (PIU) at the CDR will be responsible for providing the overall policy direction, technical assistance, review and endorsement of environmental and social assessment and management plans, capacity building for effective safeguards management to the implementing agencies, monitoring of environmental compliance and progress reporting to the World Bank. The responsibility of day to day planning, implementation and supervision of environmental/social safeguards by the PIU will be coupled with the role of focal point(s) for environmental and social safeguards who will be in charge of ensuring timely and sound application of the ESMPs to the planned investments. The environmental/social focal points will work closely with the PIU environmental/social consultant to ensure harmonization and coordination of activities according to the ESMF requirements. In addition, at the field level, it is expected that the PIU will require the engineering and technical firms to recruit specialized staff in environment, social development and health and safety to conduct continuous supervision on field activities and prepare non-compliance reports on which the PIU will investigate and take action. In this context, the PIU may also conduct periodic field supervision to check on compliance with the ESMP mitigation measures.

As for the contractors, they are required to implement mitigation measures during the rehabilitation phase as per the signed Contract for Civil Works. Implementation of the ESMPs will largely be the contractor's responsibility and therefore the contractor will have to nominate qualified environmental, health and safety consultant and a social development consultant (if needed) in order to ensure compliance with the ESMPs during rehabilitation.

During the operation phase, the contractor will still be bound to undertake impact mitigation alongside routine repair for a one-year Defect Liability Period. Beyond the Defect Liability Period, all mitigation will fall on the Municipality. Figure 7-1 below illustrates the institutional setup for project implementation.

Figure 7-1. Institutional setup for project implementation



7.1.2 Training

In the context of the proposed project that encompasses simple rehabilitation activities, environmental management during the rehabilitation and operation activities are relatively simple to ensure environmental protection. This can be accomplished through competent personnel with appropriate educational and professional background and instituting a periodic training program 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. Thus, contractors personnel (including laborers) who will be involved in the rehabilitation of the proposed project as well as personnel who will be involved in monitoring activities from the supervising Consultant may attend an environmental training workshop prior to the initiation of project activities. Relevant

staff from the concerned municipalities are encouraged to attend, as they will be indirectly supervising the works on the ground. The objective of this training is to ensure appropriate environmental awareness, knowledge and skills for the implementation of environmental mitigation measures. Environmental training sessions will be conducted twice a year for a period of one day during the rehabilitation phase. The training program will emphasize on pollution prevention measures and techniques during both phases. The cost and schedule of this training program will be 2,000 USD per day including material preparation. Repeat workshops will be at 1,000 USD per day. The training program will cover at least the following topics:

- ❑ Environmental laws, regulations, and standards
- ❑ Pollution health impacts
- ❑ Pollution prevention measures
- ❑ Sampling techniques and environmental monitoring guidelines (air, noise, water)
- ❑ Protection of cultural heritage in developmental projects
- ❑ Traffic and pedestrian safety measures
- ❑ Code of conduct for laborers and interactions with nearby communities
- ❑ Awareness sessions about internal GRM for workers

7.1.3 Reporting

Progress reporting on safeguards compliance will take place as indicated in the ESMF (CDR, 2018) and listed below:

- ❑ Contractor's environmental compliance reports to the Environmental Supervision Consultant on monthly basis;
- ❑ Environmental Supervision Consultant reviews and approves the contractor reports and submits to the PIU at the CDR Roads and Transport Department on monthly basis
- ❑ PIU environmental/social progress reports to the WB, on a quarterly basis. (This will be part of the quarterly project progress report produced by the PIU).

7.2 Mitigation Plans

While the road rehabilitation is associated with some potential negative impacts, most of them can be alleviated. Table 7-1 and

Table 7-2 present a summary of environmental and Table 7-3 of social mitigation measures that should be adopted to eliminate or minimize these impacts. They are presented in two parts namely during the rehabilitation (Table 7-1) and operation (Table 7-2) phases. Note that for a project of this relatively small scale at the individual road level and restricted to rehabilitation with the confines of the existing right of way, it is most effective to include the supervision and cost of the mitigation measures within the activities of the contractor (an on-site engineer responsible for HSE implementation amongst other tasks) and the supervising consultant (an on-site engineer responsible for HSE supervision amongst other tasks). Upon public complaint, a third party (consultant) can also be appointed by CDR to conduct periodic checks on the overall implementation of mitigation measures.

7.2.1 Environmental Mitigation Plan

Table 7-1. Environmental Mitigation Plan for the Batroun district roads during the rehabilitation phase

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility of mitigation</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
Traffic delays and congestion	<ul style="list-style-type: none"> <input type="checkbox"/> Schedule transportation of construction materials during off - peak traffic hours and during night time. Generally peak traffic hours are from 7 to 10 am and from 3 to 6 pm. <input type="checkbox"/> Develop routing strategies for construction-related traffic to avoid sensitive receptors <input type="checkbox"/> Inform the public about the schedule of rehabilitation activities <input type="checkbox"/> Maintain access to roadside businesses and residences via detours and temporary access features <input type="checkbox"/> Ensure adequate warning, signing, delineation and channeling at least 500 m down and up-gradient from the construction site. <input type="checkbox"/> Provide personnel to manage traffic at the rehabilitation site, supported by Municipal police if need be <input type="checkbox"/> Avoid peak traffic times when laying asphalt and to the extent feasible, always keep part of the road accessible 	<input type="checkbox"/> Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks
Air emissions	<ul style="list-style-type: none"> <input type="checkbox"/> Ensure adequate maintenance and repair of construction machinery and vehicles; <input type="checkbox"/> Maintain good housekeeping practices that keep the site and its surroundings clean <input type="checkbox"/> Ensure good quality of diesel fuel used with on-site equipment <input type="checkbox"/> Turn off all equipment when not in use <input type="checkbox"/> Sprinkle water on the construction site on windy days to hamper the generation of dust and its entrainment in the wind <input type="checkbox"/> Ensure that excavated soil and fine construction material that are stored on site are properly sited away from the dominant wind direction and that they are watered and/or covered entirely by impervious sheeting when not in use <input type="checkbox"/> Handle cement material properly <input type="checkbox"/> Keep hauling routes free of dust and regularly cleaned <input type="checkbox"/> Ensure good quality of fuel is used in trucks transporting construction material to and from site 	<input type="checkbox"/> Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility of mitigation</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
	<ul style="list-style-type: none"> ❑ Ensure optimum and regular transportation of construction materials to minimize storage of large heaps on-site and to minimize concentrated truck-trips. ❑ Cover all vehicles hauling materials likely to give off excessive dust emissions; ❑ Restrict vehicle speeds to 25km/h on unpaved roads and trucks 			
Increased noise levels	<ul style="list-style-type: none"> ❑ Use quiet/well-maintained equipment ❑ Regularly maintain equipment and turn them off when not in use ❑ Use operational noise mufflers ❑ Limit construction activities to working hours designated by decision number 2/163 – 31/1/1995 	❑ Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks
Biodiversity	<ul style="list-style-type: none"> ❑ Conduct careful rehabilitation work where the road crosses “Al Jaouz” river or passes next to the Tannourine Cedars Reserve in order to avoid damaging the nearby ecosystems. Isolate the stretch over the river with a 2 meter blocked fence ❑ Control workers’ movement and activities to avoid infringing on the nearby ecosystems including agricultural areas. ❑ Instruct workers to protect flora and fauna when feasible as well as their habitats. ❑ Prohibit dumping of solid and liquid waste into the natural environment ❑ Install speed bumps and animal crossing signage on Road 4 close to the Tannourine Cedar Reserve 	❑ Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks
Generation of construction waste	<ul style="list-style-type: none"> ❑ Minimize the generation of construction waste ❑ Adequately sort construction waste to remove any hazardous substances ❑ Reuse inert waste materials as filling material for road reconstruction where feasible ❑ Establish an arrangement with the municipality and the North Lebanon Governor to secure suitable locations for construction waste disposal 	❑ Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility of mitigation</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
Pollution of soil and water resources	<ul style="list-style-type: none"> ❑ Minimize usage of chemicals (lubricants, oil, solvents) ❑ Ensure the proper storage of building materials, asphalt, oil and chemicals on-site in well- controlled areas and away from river banks ❑ Do not discharge wastewater into river or on soils ❑ Do not discharge waste oil into rivers or on soils ❑ Contractor to provide mobile/portable cabin toilet linked to the existing wastewater network. When the latter is absent within the work zone, the toilet is linked to a polyethylene storage tank that is emptied when full into the nearest wastewater network. ❑ For vehicles and equipment, the Contractor will have to rent a land within the Project area. This land should be fenced and used for parking purpose only. The Contractor shall not perform any repair on site and is obliged to execute vehicles and equipment maintenance in a repair shop preferably located within the Project area. ❑ Waste material or water containing waste chemicals such as thinners, oil, and mineral spirits shall not be pumped or disposed of into storm water drains, sanitary sewers or into the ground. ❑ Cover any stockpiled construction material covered with an impermeable layer. ❑ Store diesel in designated tanks away from the road maintenance site and drainage ditches. Place it on an elevated concrete base to prevent soil or water pollution in case of accidental spill at the specified storage location. ❑ Conduct all refueling operations off-site. Fuel vehicles up before arriving to the road section. ❑ Decrease water usage ❑ Maintain surface water drainage ❑ Ensure that in the event of any fuel or chemical spills, the affected area is attended to and that the top soil is removed for disposal. A spill response plan shall be in place and all workers should be trained on its implementation. 	<ul style="list-style-type: none"> ❑ Contractor 	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility of mitigation</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
	<ul style="list-style-type: none"> <input type="checkbox"/> Control over vehicle hauling hazardous materials <input type="checkbox"/> Clean the site periodically <input type="checkbox"/> Each receptacle should be marked with the correct technical name of the substance it contains. <input type="checkbox"/> Incompatible materials shall not be placed in common containment. <input type="checkbox"/> Used or waste fuel or other waste chemicals shall be stored in an isolated area until collected for off-site disposal by an approved waste contractor. <input type="checkbox"/> Vehicle and equipment wash-down should only be done in designated areas away from the road under rehabilitation to protect water and soil quality in the area. <input type="checkbox"/> A collection system shall be provided under any machinery or equipment that may leak hydrocarbons (e.g. mobile generator). <input type="checkbox"/> Control all operations involving the use of concrete to avoid leaching into water sources. <input type="checkbox"/> Provide bins on-site for the disposal of non-construction related wastes <input type="checkbox"/> Work with the municipality to include the site on the current solid waste collection route <input type="checkbox"/> Minimize soil exposure time <input type="checkbox"/> Install retaining walls before starting with drainage ditch excavations to block soil erosion <input type="checkbox"/> Carry out excavations for drainage channels in complete precision and transport resulting excavated soil to offsite locations for proper disposal in case of contamination. <input type="checkbox"/> Reduce the time excavated drainage channels remain unsupported <input type="checkbox"/> Keep vegetation clearing to a minimum and encourage re-vegetation immediately after construction activity finishes, at sites where vegetation is removed, <input type="checkbox"/> Place geotextile silt traps as appropriate 			

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility of mitigation</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
Resources consumption	<ul style="list-style-type: none"> <input type="checkbox"/> Replace wet cleaning methods with dry clean-up methods whenever practical (sweeping, dust collection vacuum, wiping...etc.), while taking into consideration dust generation. <input type="checkbox"/> Install signs near water-using appliances to encourage water conservation. <input type="checkbox"/> Use appropriate water proof sheeting to cover the concrete after water curing to preserve moisture and reduce the evaporation that leads to decrease water quantities used <input type="checkbox"/> Turn off equipment when not in use <input type="checkbox"/> Regularly maintain machinery and generators and operate them in an efficient manner. <input type="checkbox"/> Do not leave vehicles idle for long periods. <input type="checkbox"/> Site offices shall be well insulated to retain heat or cool, utilize energy efficient bulbs and energy efficient cooling systems. <input type="checkbox"/> Reuse excavated material whenever feasible <input type="checkbox"/> Accept construction material only from permitted/licensed quarrying sites 	<input type="checkbox"/> Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks
Existing infrastructure	<ul style="list-style-type: none"> <input type="checkbox"/> Obtain road plans and elevation for each road <input type="checkbox"/> Develop procedures for rapid notification of the concerned municipality/ ministry, in the case of disruption of any existing utility, along, with requirements for immediate assistance with re-instatement, and close follow-up with concerned authorities 	<input type="checkbox"/> Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks
Visual intrusion	<ul style="list-style-type: none"> <input type="checkbox"/> Document existing conditions prior to initiation of the works <input type="checkbox"/> Preserve existing vegetation when feasible <input type="checkbox"/> Restore depleted vegetative cover by replanting with endemic trees (pine, oak, etc.) where cutting is necessary during construction. <input type="checkbox"/> Clearance all equipment, spoil heaps, and other materials after construction <input type="checkbox"/> 	<input type="checkbox"/> Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility of mitigation</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
Health and safety	<ul style="list-style-type: none"> <input type="checkbox"/> Follow CDR's and WB's safety, health and environmental regulations and guidelines <input type="checkbox"/> Ensure the construction sites are completely enclosed and restrict entrance to construction personnel <input type="checkbox"/> Create buffer zones around the site and provide pedestrian walk ways <input type="checkbox"/> Ensure traffic by-passes in working areas <input type="checkbox"/> Install clear warning signs <input type="checkbox"/> Provide adequate loading and off-loading space within the site itself <input type="checkbox"/> Provide appropriate personal protective equipment to construction workers, including helmets and earmuffs) <input type="checkbox"/> Provide on-site first aid kit with adequate content (ex. including antiseptic fluid, gauze, cotton etc. and other items that are needed to deal with any cuts and bruises) <input type="checkbox"/> Provide accident insurance for workers 	<input type="checkbox"/> Contractor	Supervision Consultant	Included as part of the construction and supervision activities. Contractor on-site engineer for HSE implementation amongst other tasks Consultant on-site engineer responsible for HSE supervision amongst other tasks

Table 7-2. Environmental Mitigation Plan for the Batroun district roads during the operation phase

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
Traffic congestion & delays	<input type="checkbox"/> Maintain road safety infrastructure	<input type="checkbox"/> MOPWT	<input type="checkbox"/> Municipality	Included as part of the construction and supervision activities for a one-year Defect Liability Period during operation.
Noise	<input type="checkbox"/> Provide speed limit signs at critical locations and enforce speed limit <input type="checkbox"/> Regularly maintain the roads	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	Included as part of the construction and supervision activities for a one-year Defect Liability Period during operation.
Biodiversity	<input type="checkbox"/> Refer to rehabilitation phase <input type="checkbox"/> Maintain lighting source <input type="checkbox"/> Maintain speed bumps and signage	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	Included as part of the construction and supervision activities for a one-year Defect Liability Period during operation.
Water and soil quality	<input type="checkbox"/> Maintain surface water drainage systems <input type="checkbox"/>	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	Included as part of the construction and supervision activities for a one-year Defect Liability Period during operation.
Resource consumption	<input type="checkbox"/> Using water-efficient equipment during maintenance operations to avoid excessive and overuse of water	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	Included as part of the construction and supervision activities for a one-year Defect Liability Period during operation.
Visual intrusion	<input type="checkbox"/> Ensuring that lights are turned off by a timer or manually when	<input type="checkbox"/> MOPWT	<input type="checkbox"/> MOPWT	Included as part of the construction and

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
	they are not needed.	<input type="checkbox"/> Municipalities	<input type="checkbox"/> Municipalities	supervision activities for a one-year Defect Liability Period during operation.
Health and safety	<input type="checkbox"/> Follow CDR's and WB's safety, health and environmental regulations during maintenance works <input type="checkbox"/> Proper road management, signage and maintenance	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	<input type="checkbox"/> MOPWT <input type="checkbox"/> Municipalities	Included as part of the construction and supervision activities for a one-year Defect Liability Period during operation.

7.2.2 Social Mitigation Plan

Table 7-3. Social Mitigation Plan for the Batroun district roads during the rehabilitation phase

<i>Potential Impacts</i>	<i>Proposed Mitigation Measures</i>	<i>Responsibility</i>	<i>Responsibility of direct supervision</i>	<i>Estimated Cost</i>
Socio-economics	<ul style="list-style-type: none"> ❑ Inform the public about the schedule of construction activities ❑ Provide alternative access to residences and roadside businesses ❑ Adopt traffic management plans to ensure a safe and efficient movement of traffic ❑ Develop and communicate clear criteria for job selection and allocation, with attention to ratio of Syrian and Lebanese community workers, types of positions and jobs restricted to Lebanese citizens, and consideration also for sub-group allocations within communities. ❑ Ensure work permit requirements are satisfied in accordance to the Ministry of Labor regulations ❑ Maintain labor registry and age verification record to protect against potential child labor ❑ Ensure non-discrimination and fair treatment such as equal wages/benefits and working conditions among workers ❑ Establish and ensure that GRM is applicable for communities and for workers (both Lebanese and Syrian workers) to file their complaints. ❑ Provide the option of anonymity under the GRM for both internal and external complaints. ❑ Maintain a site construction insurance plan that covers all workers in case of injury or accidents during construction. ❑ Provide workers with the necessary training and awareness raising session on issues related to SEA/H 	<ul style="list-style-type: none"> ❑ Contractor 	Supervision Consultant	<p>Included as part of the construction and supervision activities.</p> <p>Contractor on-site engineer for HSE implementation amongst other tasks</p> <p>Consultant on-site engineer responsible for HSE supervision amongst other tasks</p>

7.3 Monitoring Plan

7.3.1 Monitoring Plan Implementation

Monitoring should be conducted to evaluate the impact analysis, check on the implementation and the effectiveness of mitigation measures, respond to unanticipated environmental and social impacts, and improve environmental and social controls. Since the project is a category B,

monitoring activities for such projects rely primarily on visual observation and photographic documentation although measurements of certain indicators (traffic count, air / water quality and noise level) can be conducted when public complaints are raised. The project supervising consultant holds the direct responsibility of monitoring activities during the rehabilitation phase to ensure the implementation of the mitigation plan by the contractor. Upon public complaints, a third party (consultant) can also be appointed by CDR to conduct periodic monitoring with measurements of environmental indicators depending on the nature of the complaint. Table 7-4 presents a summary of monitoring indicators / activities during the rehabilitation phase.

During the operation phase, regular monitoring activities become more part of the duties and responsibilities of local municipalities and stakeholders. Similar to the rehabilitation phase, upon public complaints, a third party (consultant) can also be appointed by CDR to conduct periodic monitoring with measurements of environmental indicators depending on the nature of the complaint. (Table 7-5).

Table 7-4. Environmental and Social Monitoring Plan for the Batroun district roads during the rehabilitation phase

<i>Impact</i>	<i>Monitoring activities</i>	<i>Responsibility</i>	<i>Frequency/ Duration</i>	<i>Location</i>	<i>Methods</i>	<i>Estimated Cost¹</i>
<i>Traffic</i>	Continuous supervision with periodic photographic documentation of mitigation measures (congestion, traffic disruption, speed limits, working hours, the presence of a traffic police and construction worker at detours)	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
<i>Air quality</i>	Continuous supervision with periodic photographic documentation of mitigation measures (vehicle and excavation emissions, turning off of equipment not in use, equipment maintenance, type of fuel used on site and in hauling trucks, speed limits, cleanliness of site, water spraying, storage conditions of soil and fine construction material, working hours, schedule of material transportation	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
	Total Suspended Particles (TSP), PM ₁₀ , PM _{2.5} (wherever feasible), SO _x , NO _x and CO	Supervising Consultant	Upon public complaint	At site and at sensitive receptors within 100 m from site	1-hr measurements, and visual observation of dust dispersion (scale and direction)	2000\$/event

<i>Noise</i>	Continuous supervision with periodic photographic documentation of mitigation measures (equipment mufflers, equipment maintenance, equipment turned off when not in use, speed limits, working hours) and measurements of indicators in case of public complaints	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
	L_{eq} , L_{min} and L_{max}	Supervising Consultant	Upon public complaint	At site and at sensitive receptors within 100 m from site	Single sample per location (average 1hr reading-15min intervals) during morning (7-8am), evening (1-2pm) and night (4-5pm)	500\$/ event
<i>Biodiversity</i>	Continuous supervision with periodic photographic documentation of mitigation measures (worker movement and activity, waste disposal, etc.)	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
<i>Construction and other solid waste</i>	Continuous supervision with periodic photographic documentation of mitigation measures while maintaining a record of waste generation, collection, segregation, storage, transportation and disposal in terms of type, quantity, and disposal location of generated waste	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
<i>Runoff water/ drainage</i>	Continuous supervision with periodic photographic documentation (chemical usage, chemical and material storage, water usage, bins for solid waste disposal, wastewater discharge from mobile/portable toilets and storage tanks into existing or nearest sewage network. oil spill management) while checking on culverts particularly following rainfall events	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks

	Water quality analysis	Supervising Consultant	Upon public complaint	At nearby river/ stream	Totals suspended solids, BOD, COD, Oil and grease	1000\$/ event
<i>Resource consumption</i>	Continuous supervision with periodic photographic documentation of reuse of excavated material, water and energy conservation practices and design elements	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
<i>Existing infrastructure</i>	Continuous supervision with periodic photographic documentation of excavation and response to disruption of underground utilities	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
<i>Visual intrusion</i>	Continuous supervision with periodic photographic documentation of excavation and re-planting / re-vegetation while checking on culverts particularly following rainfall events	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
<i>Health and Safety</i>	Continuous supervision with periodic photographic documentation (PPE, site enclosure, buffer zones, warning signs, first aid kit, accident insurance), while maintaining a record of injuries / accidents specifying cause and location	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks
<i>Socio-economic</i>	Continuous supervision with periodic photographic documentation of mitigation measures while maintaining a record of employment and grievance, sharing construction schedule with the public, access to roadside businesses and residences, and grievance record	Supervising Consultant	Daily	At rehabilitation site	Visual observation and photographic documentation	Consultant on-site engineer responsible for HSE supervision amongst other tasks

Table 7-5. Environmental and Social Monitoring Plan for the Batroun district roads during the operation phase (up to one year after project completion)

<i>Impact</i>	<i>Monitoring activities</i>	<i>Responsibility</i>	<i>Frequency/ Duration</i>	<i>Location</i>	<i>Methods</i>	<i>Estimated Cost</i>
<i>Air quality</i>	Total Suspended Particles (TSP), PM ₁₀ , PM _{2.5} (wherever feasible), SO _x , NO _x and CO	Supervising Consultant	Upon public complaint	At site and at sensitive receptors within 100 m from site	1-hr measurements, and visual observation of dust dispersion (scale and direction)	2000\$/event
<i>Noise</i>	L _{eq} , L _{min} and L _{max}	Supervising Consultant	Upon public complaint	At site and at sensitive receptors within 100 m from site	Single sample per location (average 1hr reading-15min intervals) during morning (7-8am), evening (1-2pm) and night (4-5pm)	500\$/ event
<i>Water</i>	Totals suspended solids, BOD, COD, Oil and grease	Supervising Consultant	Upon public complaint	At nearby river/ stream	Single sample analytical analysis	1000\$/ event

7.3.2 Documentation and Reporting

During the rehabilitation phase, the Supervising Consultant shall submit a monthly report about the monitoring activities to various stakeholders including the CDR and the municipalities. These reports shall be made readily available or accessible to the public upon submittal. The content of a typical report should mirror the indicators of the mitigation plan with proper photographic documentation and actions taken in the event of accidents, concerns or complaints. The report would include an executive summary in Arabic for the use of the municipalities.

7.3.3 Guidelines for Health and Safety Plan during rehabilitation

During rehabilitation, the contractor shall abide by the CDR Safety, Health, and Environmental Regulations for Construction Projects (Annex C) as well as the WBG Environmental Health and Safety General Guidelines.

8 CONSULTATION, DISCLOSURE AND GRIEVANCE REDRESS MECHANISM

8.1 Public Consultation

A public consultation meeting was conducted on December 20, 2019 with the Federation of Municipalities of the Batroun district during which the ESMP results were presented (see Annex D). Thirty four individuals attended the meeting including 20 heads of municipalities in the Batroun district and 8 females (Figure 8-1).

Figure 8-1. Public participation session with Batroun district stakeholders



The session started with a welcome note from Mr. Marcellino Hark, the head of the Batroun Municipality and the Head of the Federation of Municipalities of the Batroun Caza. This was followed by a presentation by Dr. Mutasem El-Fadel, the environmental expert from TEAM International who explained the components of the overall REP, displayed the layout of the selected roads in the Batroun Caza, and discussed the proposed ESMP. Dr. El-Fadel also gave contact numbers for the TEAM and CDR for any further questions or future complaints or grievances. Dr. El-Fadel emphasized that the selected roads have been approved by a Ministerial Decision following much discussions with various stakeholders at many levels, and hence they cannot be changed at this stage.

The main issues and concerns that were raised by the attendees were as follows.

- ❑ This project is funded by a loan and not a grant. The money for this loan should have been used for projects that are more vital than rehabilitation of roads.
- ❑ Many complained that they were not aware of this project until now. However, it was explained that the project was discussed with the outgoing municipal heads, serving before the latest municipal elections.
- ❑ The selection criteria applied for road selection are not clear and transparent. It seems that political considerations played a significant role, as there are roads that are in need of rehabilitation more than the proposed ones. It was agreed that the municipalities, via the Federation, will prepare a list of additional roads that require rehabilitation and will submit the list to CDR for consideration in a phase 2 of the project.
- ❑ There are some sections of the proposed roads that have recently undergone rehabilitation works. Could the allocated budget be transferred to additional works along those roads?
- ❑ The concerned municipalities want to see the roads design maps to provide their opinion on the proposed rehabilitation elements. It was agreed that this can be accommodated in subsequent meetings upon the request of the Federation either with the Consultant's Engineer and with the Contractor prior to initiation of construction activities.
- ❑ There are decrees for expropriation at the Ministry of Public Works and Transport for the selected roads. These should be taken into consideration when rehabilitating the roads particularly with respect to the road width because at many locations the existing pavement may not be at full width of the road.
- ❑ Employment opportunities were discussed for both Lebanese and Syrian workers. The latter contributes significantly in the construction sector throughout Lebanon including the Batroun District. Besides private entities, the municipalities are resorting to Syrian labor in this sector in particular. There appears to be a clear split in job types between the two communities. The delineation line is between skilled jobs (mainly taken by the Lebanese workforce) and unskilled labor (filled primarily by Syrian workers). This split has resulted in a control of potential tensions or conflict between the communities.

A separate meeting was conducted with female attendees to capture their concerns. They emphasized that:

- ❑ Initiating the project works and not terminating them at all, or on time, hence prolonging the nuisance to the public should be avoided.
- ❑ Public concerns should be respected during project execution.
- ❑ Using construction material that is of good quality and that does not deteriorate rapidly, as per the agreed terms of reference.
- ❑ Avoiding the destruction of existing road elements such as signage that are in good condition and that have been installed through private initiatives. It is recommended to keep the existing ones and use surplus in funding to add other elements along the roads.
- ❑ Planting trees along the rehabilitated roads and landscaping the roundabouts.
- ❑ Encouraging the municipalities to conduct direct supervision of the works, to ensure that they are up to the agreed standards.
- ❑ Presenting design maps to the engineering department at the Federation of Municipalities of the Batroun Caza to give their technical opinion.

- Enforcing on the contractor to give priority employment to local people from the towns where the roads rehabilitation is taking place.

As for NGOs Consultation, this ESMP has targeted them according to their position in Lebanon. They consist of two levels as follows:

- Local NGOs: they are specific to each Caza. Their mission is to address different concerns and issues among the local society including social, economic, gender equality, environment, poverty, women empowerment, etc. Local NGOs were invited to the public hearings. Table 8-1 represents the name of the invited NGOs and their field of activity. Those local NGOs may play a role of advocates to reduce projects' social and environmental risks.

Table 8-1. Contacts with local NGOs and stakeholders

<i>Organization</i>	<i>Person</i>	<i>Position</i>	<i>Comments</i>	<i>Phone</i>
Batrouniyat NGO	Saji'ih Lahoud	Office Manager	Lebanese Engineers and workers. Interested in working on such projects Syrian labour is also available in Batroun district and paid mostly in cash	+961 70 707027
Tannourine Reserve NGO	Challita Tonios	Co-Founder Director	Some Lebanese workers. Syrian labour available in Batroun district and paid mostly in cash	+961 3 223428
Nature Care Association NGO	Assaad Saadeh (from Batroun district-Chabtine)	Co-Founder	NGO Founded in Batroun rural areas Appears not very active at this time Syrian labour available in Batroun district and paid mostly in cash	+961 3 420111
Bchaaleh Club	Antoine Rizk	Coordinator	Syrian labour available in Batroun district and paid mostly in cash	+961 3 524343
Rene Mouawwad Foundation	Natasha Marashelian	Director, Main Office, Beirut	Works throughout Lebanon including the Batroun district. Had many sub-contractors	+961 3 850 692

Batroun Resident	Roula Elias Khalil	Attorney IRC & OHCHR	Syrian labour available in Batroun district and paid mostly in cash Advised on Lebanese and international labour law	+961 3 983708
Batroun resident	Marwan Owaygen (from Batroun district-Batroun)	Director, IDRC Canada, MENA	Syrian labour available in Batroun district and paid mostly in cash Had many projects funded throughout Lebanon Syrian labour available in Batroun district and paid mostly in cash	+961 3 734248

IRC: International Rescue Committee; OHCHR: Office of the High Commissioner of Human Rights; IDRC: International Development and Research Center, Canada

- b) International NGOs: they are covering the whole country and their consultation will be applied to all the ESMPs of the REP. They provide relief and developmental aid to many developing countries. They support the society in responding to crises and helps people whose lives and livelihoods are shattered by conflict and disaster to survive, recover and gain control of their future. When the crisis in Syria erupted in early 2011, numerous International NGOs responded to the humanitarian crisis and worked directly with the Syrian in Lebanon by providing aid and responding to their critical situation.

This ESMP consulted International NGOs (see Table 8-2) to inform them about the Project, disseminate it, ask them to circulate its impacts and activities among Syrian and tell them that they can inquire about additional information and/or submit a complaint (if any) by contacting the Grievance Redress Mechanism (GRM) Unit on 01980096 ext:317 or send an Email to rstephan@cdr.gov.lb or register by hand an official letter at the CDR .

In Batroun Caza, the total number of registered Syrian is 14,987 individuals (UNHCR, 2018). They were contacted through the International NGOs to seek their feedback about the Project. Accordingly, this ESMP did not receive any concern about the Project.

Table 8-1: Consulted International NGOs and their Activities

NGO Name	Contacts	Intervention Sector(s)	Comments
ANERA Lebanon	Mrs. Dima Zayat Deputy Country Director T: 01382590 (ext: 105) M: 70051813 E: dzayat@aneralebanon.org	<ul style="list-style-type: none"> • Children & Youth • Development • Education • Relief Services • Water sanitation and hygiene 	Mrs. Zayat received the Project information sheet and explained that recently Anera operations in Lebanon have grown substantially

			to cope with the Syrian crisis. they have six offices throughout Lebanon. She welcomed the idea of the Project and will disseminate it across her organization.
ACTED	Mr. Jack French Deputy Country Director T: 01324331 M: 79160375 E: jack.french@acted.org	<ul style="list-style-type: none"> • Development • Infrastructure & Services Rehabilitation • Labor & Livelihoods • Shelter • Water sanitation and hygiene 	Mr. French received the Project information sheet and explained that ACTED is working with Syrian in Beirut and northern districts of Mount Lebanon (Baabda, Metn, Keserwane and Jbeil), as well as in Akkar District. He welcomed the idea of the Project and will disseminate it across his organization.
Danish Refugee Council (DRC)	Mr. Rickard Hartmann Country Director T: 01339052 (ext: 201) E: rickard.hartmann@drc.ngo	<ul style="list-style-type: none"> • Direct Assistance • Protection • Shelter • Community Empowerment and Livelihoods 	Mr. Hartmann received the Project information sheet and explained that DRC is working with Syrian on many sectors in different locations across Lebanon including Beirut, Tripoli, Kobayat and Zahle. He welcomed the idea of the Project and will disseminate it across his organization.

8.2 Grievance Redress Mechanism

The ESMP revealed mostly minor to moderate environmental and social impacts associated with the project activities particularly during the rehabilitation phase. While these impacts were discussed during the Public Consultation meeting, certainly not all potential stakeholders were or can be reached during this process. Therefore, an accessible Grievance Redress Mechanism (GRM) is warranted whereby various stakeholders can voice their concerns during all phases of the project implementation phases: pre- rehabilitation, rehabilitation, and operation. The GRM should be designed to permit a timely resolution of concerns, assuring stakeholders that their grievances have been heard and that the institutionalized mechanism will yield a fair and impartial outcome.

The CDR has developed the GRM for the REP and it was shared with the participants during public participation. There are two mechanisms for filing a grievance, one for the surrounding communities and one for the workers. Anonymous grievances will be addressed in both levels and the maximum anticipated time needed to close a GRM case is 45 days.

8.2.1 GRM for Communities

The GRM will be accessible to all relevant stakeholders who can use this mechanism to send their suggestions, concerns and complaints related to the PIU. The complaints, suggestions and concerns can be sent by email, mail, phone (through a hotline), in person and other means such as a grievance compliant logging sheet where grievances are registered in writing and maintained as a database. The phone number, e-mail address, and address for receiving complaints will be disclosed among the population and will be posted at the rehabilitation sites in Batroun Caza, before commencement of project implementation. Moreover, the information on how to access the GRM should be available through billboards, CDR website, etc.

The GRM levels of the project are the following:

- Level 1: If any person has any complaint, concern or suggestion regarding the project implementation, he or she can lodge an oral or written grievance through e-mail (GRM.REP@cdr.gov.lb), phone call or text message (01980096 ext:317), or website link (<http://www.cdr.gov.lb/study/RoadsEmp/RoadsEmp.htm>) to the site engineer or manager of the roads to be rehabilitated in Batroun Caza. In case an oral complaint is made, it should be written on paper by the receiving unit. The above issue will be resolved within a maximum duration of one week.
- Level 2: If the person is not satisfied with the action of the site manager's Office, he or she can bring the complaint to the attention of the Environmental and Social Specialist of the PIU for the project through e-mail (rstephan@cdr.gov.lb), phone call or text message (01980096 ext:317), or website link (<http://www.cdr.gov.lb/study/RoadsEmp/RoadsEmp.htm>). The issue shall be resolved within a maximum of two weeks.
- Level 3: If the person is not satisfied with the decision of the Environmental and Social Specialist of PMU, he or she can bring the complaint to the attention of the PMU Director's Office through e-mail (elieh@cdr.gov.lb), phone call or text message (01980096 ext:159), or website link (<http://www.cdr.gov.lb/study/RoadsEmp/RoadsEmp.htm>). Once the PIU Director receives the complaint, it needs to be resolved within a maximum of two weeks.

Meanwhile, it is recommended that the aggrieved party is consulted and be informed of the course of action being taken, and when a result may be expected.

Moreover, reporting of the complaints to the PIU should be done regularly. The designated person at each level should report to the PIU on the number and subject of new complaints received, and the status of the already existing complaints, if any. The report should also inform the PIU of complaints that could not be resolved at the lower levels and are being elevated to the PIU Director's attention. The PIU aggregates information received into a status report each quarter, indicating the number and subject of complaints. The quarterly status report also provides up-to-date information on the number and subject of complaints that have been resolved, and the manner in which they have been resolved. This information will be shared with the Bank.

The Complaints Register form (refer to Annex E) includes the following:

- i) details and nature of the complaint
- ii) the complainant name and their contact details
- iii) date
- iv) Corrective actions taken in response to the complaint.

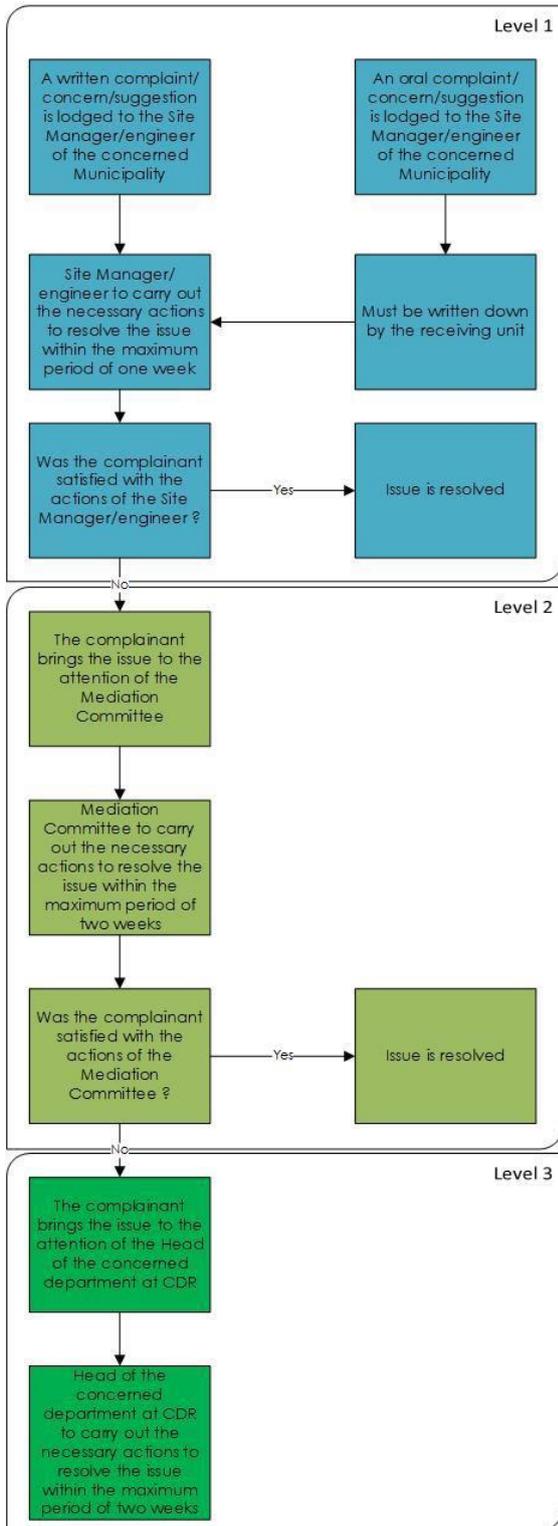
The GRM does not exclude the formal legal process of the national law. If a grievance remains unresolved following application of the project GRM process, the affected person can initiate legal proceedings in accordance with national law and may have recourse to the Appeals Court as warranted.

Figure 8 1 (overleaf) presents a detailed flowchart describing the process of grievance starting from reception of grievance to implementation of corrective measures.

8.2.2 GRM for Workers

A GRM for internal employees, namely the laborers onsite are also necessary. It aims to allow laborers to report any wrongdoings in their favor or important concerns they might have. This internal GRM is similar in nature to the one previously discussed (in terms of accessibility, reporting means, etc...). The only main difference is the contact people for each level. In this context, the first level involves reporting to the health and safety officer and has a duration of one week. The second level involves reporting to the PMU Director and should be resolved within one weeks. It also follows the Complaints Register form (refer to Annex E).

Figure 8-2. Typical grievance redress mechanism for the REP



Source: CDR, 2018



9 CONCLUSION

The ESMP revealed that the REP within the Batroun Caza will have positive socio-economic impacts both during rehabilitation, through the creation of jobs for both skilled and unskilled workers, and during operation by improving accessibility to the villages in the caza as well as livelihoods. However, its implementation is associated with a variety of environmental and social impacts that are reversible and can be controlled through mitigation measures all while ensuring proper environmental monitoring during both the rehabilitation and operation phases. The ESMP outcome is consistent with the ESMF (CDR, 2018) that concluded that the REP activities are not expected to have significant environmental impacts and equally no anticipated impacts on physical and cultural resources or natural habitats, no involuntary resettlement, and no land acquisition.

REFERENCES

- Abdallah C. 2007. Application of remote sensing and geographical information system for the study of mass movements in Lebanon. Tectonics. Université Pierre et Marie Curie - Paris VI.
- Canter, L.W. 1995. Environmental impact assessment. McGraw-Hill, New York.
- CAS, UNDP and MoSA. 2004. Living Conditions and Household Budget Survey.
- CDR. 2018. Environmental and Social Management Framework for the Roads and Employment Project. Republic of Lebanon.
- De Nevers, N. 2000. Air Pollution Control Engineering. McGraw-Hill Inc., New York.
- El-Samra R., Bou-Zeid E., and El-Fadel M. 2018. What model resolution is required in climatological downscaling over a complex terrain? Atmospheric Research, 203, 68-82.
- Federal Highway Administration (FHWA). 1997. Procedures for abatement of highway traffic noise and construction noise-23 CFR PART 772. Online. Available: <http://www.fhwa.dot.gov//environment/23cfr772.htm#table1>.
- Huijer C., Harajli M. and Sadek S. 2011. Upgrading the seismic hazard of Lebanon in light of the recent discovery of the offshore thrust fault system. Lebanese Science Journal, Vol. 12, No. 2.
- JICA. 2018. Initial Environmental Examination (IEE) Report Annex No. 5 Batroun Caza. Prepared by Geoflint, January 2018.
- Ministry of Environment. 2001. State of the Environment Report. Beirut. Lebanon.
- Ministry of Public Health. 2016. Statistical Bulletin 2016. Online. Available: <https://www.moph.gov.lb/en/Pages/8/327/statistical-bulletins>
- Rich C. and Longcore T. 2006. Ecological consequences of artificial night lighting. Island Press, Washington, D.C.
- Rocha A. 2007. Bird Inventory in Arz Tannourine. Online. Available: <http://arztannourine.org/tannourine/wp-content/uploads/2015/08/Tannourine-report-december-1.pdf>
- Salem, S. 2014. Assessing the Environmental Impacts of Work Zones in Arterial Improvement Projects (No. N14-16). TranLIVE.
- Sbayti, H. 2000. Air pollution modeling of transport-related emissions in the Solidere area. M.S. thesis, Department of Civil and Environmental Engineering, American University of Beirut, Lebanon.
- Supe S.M. Gawande. 2013. Effect of dust fall on vegetation. International Journal of Science and Research (IJSR) 4: 2319 7064.
- The World Bank Group. 2019. Climate Change Knowledge Portal. [Online] Available at: http://sdwebx.worldbank.org/climateportal/index.cfm?page=country_historical_climate&ThisCCCode=LBN
- UNDP 1970. Liban etude des eaux souterraines. New York, 186 p.
- UNHCR. 2018. Distribution of the registered Syrian refugees at the Cadastral level. North Governorate, Tripoli, Batroun, Bcharreh, El Koura, El Minieh-Dennieh, Zgharta Districts. Online. Available: <https://data2.unhcr.org/en/documents/download/62225>.
- World Bank. 2002. The World Bank Policy on Disclosure of Information. June 2002. The World Bank, Washington D.C.

ANNEXES

- A. Methodology for estimating impact on air quality**
- B. Methodology for estimating impact on noise levels**
- C. CDR Safety, Health, and Environmental Regulations**
- D. Public Participation**
- E. Complaints Register form**

Annex A –Methodology for estimating impact on air quality

Construction phase

Heavy construction is a source of dust emissions that may have substantial temporary impact on local air quality. Road construction is an example of a construction activity with high emissions potential. Emissions during the construction of a road in general, and the REP in particular, are a function of the excavation scheme, building demolition and the machinery used on-site. Emissions will consist primarily of particulate dust matter released as a result of earth removal activities, and to a lesser extent of emissions from the on-site usage of heavy construction equipment. Dust emissions often vary substantially from day to day, depending on the level of activity, the specific operations, and the prevailing meteorological conditions. A large portion of the emissions results from equipment traffic over temporary roads at the construction site. For this phase, it is expected that negative impacts on air quality will occur in and around the immediate vicinity of the site under construction. In order to quantify this impact, the total construction emissions and the corresponding ambient particulate matter concentration were estimated as described below.

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 aerial emission factor (EF) for the construction activities that is used in the estimation of total emissions (USEPA, 1995) is:

$$EF = 0.3 \text{ Kg/m}^2/\text{month of activity}^{19}$$

Assuming the road rehabilitation will take place in phases and that a 500 m road section will be rehabilitated per phase, the temporal emission factor for the total construction area of 2500-3500 m² and a duration of 2 month of activity, considering 22 working days/month and 8 hours/day of work is:

$$S = 0.3 \times (2500-3500) / (2 \times 22 \times 8 \times 3600)$$

$$S = 0.000592- 0.000829 \text{ Kg/s} = 592,000-829,000 \text{ }\mu\text{g/s}$$

Note that a better method is to estimate construction emissions for a particular construction site, the construction process be broken down into component operations, each involving traffic and material movement. However, due to the random nature of construction activities, and lack of design data, the extent of PM impact cannot be quantified using this method.

Step 2: Summary of key meteorological parameters with regard to air pollution dispersion namely, mixing height, inversion height, and mean annual wind speed (Table A1).

Table A1. Summary of key meteorological parameters

<i>Parameter</i>	<i>Typical scenario</i>	<i>Worst case scenario</i>
<i>Mixing height</i>	1,000 ^a m	1 m
<i>Average wind speed</i>	1 ^b m/sec	0.5 m/sec
<i>Wind direction</i>	west	west

^a De Nevers, 1995

^b Refer to the windrose in Figure 4-13.

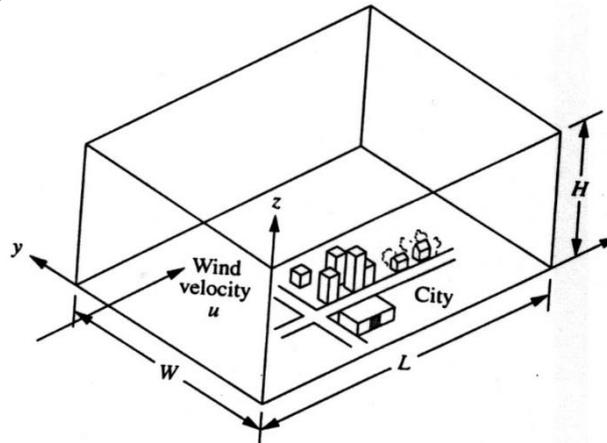
¹⁹ The value is most applicable to construction operations with (1) medium activity level, (2) moderate silt contents, and (3) semiarid climate.

Step 3: Application of the Fixed Box Model to calculate ground-level concentration of PM

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

- ❑ The 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.

Figure A1. Rectangular city in a fixed box model



$$c = b + \frac{SL}{WLuH} \quad (A1)$$

- Where,
- c = Concentration of PM in the entire site ($\mu\text{g}/\text{m}^3$)
 - b = Background PM concentration ($\mu\text{g}/\text{m}^3$)
 - S = Emission rate of PM ($\mu\text{g}/\text{s}$)
 - 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 A2, taking into consideration two scenarios: the typical scenario and the worst-case scenario.

Table A2. Input data for the box model

Parameter	Typical scenario	Worst case scenario
W	107 m	55 m
L	500 m	1000 m
H	1,000 m	1 m
b	27.3 $\mu\text{g}/\text{m}^3$	27.3 $\mu\text{g}/\text{m}^3$
u	1 m/s	0.5 m/s
S	592,000 $\mu\text{g}/\text{s}$	829,000 $\mu\text{g}/\text{s}$

By direct substitution of the values in Equation A1, the predicted total PM concentration at a road segment site is expected to range between 32.8 $\mu\text{g}/\text{m}^3$ under typical conditions, and 15,515 $\mu\text{g}/\text{m}^3$ under worst-case conditions. For typical conditions, the expected PM concentrations are below the national 24-hr standard (120 $\mu\text{g}/\text{m}^3$) and WHO 24-hr guideline (50 $\mu\text{g}/\text{m}^3$). As for worst-case conditions, the expected PM concentrations significantly

exceed the national 24-hr standard and WHO 24-hr guideline. Note that this impact is typically temporary and confined to the immediate site vicinity, particularly if proper management measures are adopted as described below in the impact mitigation.

Operation phase

During the operation phase, air emissions in the project area will be a function of the anticipated traffic volumes, in addition to the vehicle fleet attributes. In order to assess the potential magnitude of the project on the ambient air quality in the project area, the highway was modeled using a line source Gaussian plume model, as described below.

Step 1: calculation of uniform emission rate along the road ‘q’

Current and projected vehicle volumes are presented in Table A3. The design speed along the proposed roads is 50 km/hr.

Table A3. Current and future traffic projections and fleet characteristics

<i>Road code</i>	<i>Villages</i>	<i>Existing Traffic Volume ADT</i>	<i>Future Traffic Volume ADT (20 Years)</i>	<i>Vehicle Fleet Composition</i>
<i>Road 4</i>	<i>Hourata-Harisa</i>	3,162	5,711	97% light vehicles 2 % Medium 1% Heavy
<i>Road 5</i>	<i>Beit Shlala- Kfar Helda</i>	1,216	2,196	96% light vehicles 3.5 % Medium 0.5% Heavy
<i>Road 6</i>	<i>Kour - Zan - Asia</i>	305	551	97.5% light vehicles 2 % Medium 0.5% Heavy
<i>Road 7N</i>	<i>Kfour AlArabi</i>	179	323	93.5% light vehicles 6 % Medium 0.5% Heavy

Pollutant emissions from vehicles vary depending on vehicle characteristics, and ambient conditions such as temperature, humidity, altitude, and wind. Emission factors are strongly influenced by the average speed. These factors increase sharply at low average speed, typical of highly congested stop and go urban driving. Emissions are minimized in free-flow traffic at moderate speed, as expected to be along the proposed highway. The major characteristics of the Lebanese fleet that were used in the calculation of pollutant emissions include an average fleet age of 14 years and a value of 10% of the fleet subject to regular inspection and maintenance.

The equations for emission factors of the Lebanese fleet as a function of speed as described by Sbayti (2000), using MOBILE5B and regression analysis, were deduced for the years 2019 and 2039²⁰, as shown below in Table A4.

Table A4. Vehicular emissions at different speeds (Sbayti, 2000)

<i>Year</i>	<i>Pollutant</i>	<i>Equation</i>	<i>Speed (mph)</i>	<i>EF (g/mile)</i>
2019	CO	$EF = 701.61S^{-0.8697}$	31	35.4
2039	CO	$EF = 268.15S^{-0.8657}$	31	13.7

Where EF is the emission factor in g/mile, and S the average speed in mph.

²⁰ The emission factors for the year 2015 under the do-nothing scenario in terms of emissions reduction were used. For 2019, the emission factor was assumed to be equivalent to the 2015 emission factor under the ‘basic conditions’ strategy. For 2039, the emission factor was assumed to be equivalent to the 2015 emission factor under the ‘advanced inspection and maintenance’ strategy.

A uniform emission rate q , in $\mu\text{g}/\text{m}\cdot\text{sec}$, along the road length can be estimated as follows:

$$q = EF \cdot \text{vehicle volume}$$

Accordingly, current and future emission rates along the proposed roads are presented in Table A5.

Table A5. Current and future traffic projections and fleet characteristics

Road code	Villages	Existing Traffic	2019	Future Traffic	2039
		Volume ADT (vehicle/day)	Emission rate q ($\mu\text{g}/\text{m}\cdot\text{sec}$)	Volume ADT (20 Years) (vehicle/day)	Emission rate q ($\mu\text{g}/\text{m}\cdot\text{sec}$)
Road 4	Hourata-Harisa	3,162	805.3	5,711	563.6
Road 6	Kour - Zan - Asia	305	77.7	551	54.4
Road 7N	Kfour AlArabi	179	45.6	323	31.9
Road 5	Beit Shlala- Kfar Helda	1,216	309.7	2,196	216.7

Step 2: calculation of dispersion coefficients ' σ_z ' and ' σ_y '

The general equations for the dispersion coefficients as given by Cooper (1996) are,

$$\sigma_y = aX^b$$

$$\sigma_z = cX^d + f$$

Where a , b , c , d , and f are constants that are dependant on the stability class and on downwind distance X as given in Table A6.

Table A6. Constants for calculating dispersion coefficients as a function of downwind distance and atmospheric stability

Stability class	a	b	$X < 1 \text{ km}$			$X > 1 \text{ km}$		
			c	d	f	c	d	f
A	213	0.894	440.8	1.941	9.27	459.7	2.094	-9.6
B	156	0.894	106.6	1.149	3.3	108.2	1.098	2
C	104	0.894	61	0.911	0	61	0.911	0
D	68	0.894	33.2	0.725	-1.7	44.5	0.516	-13
E	50.5	0.894	22.8	0.678	-1.3	55.4	0.305	-34
F	34	0.894	14.35	0.74	-0.35	62.6	0.18	-48.6

Tables A7 and A8 present the values of dispersion coefficients at different downwind distances, for various stability classes.

Table A7. σ_y at different downwind distances, for various stability classes

Stability class	Downwind distance (m)									
	100	200	300	400	500	600	700	800	900	1000
A	29.49	54.79	78.73	101.82	124.31	146.31	167.93	189.22	210.23	231.00
B	19.91	37.00	53.17	68.76	83.95	98.81	113.41	127.79	141.98	156.00
C	13.27	24.67	35.45	45.84	55.96	65.87	75.61	85.19	94.65	104.00
D	8.68	16.13	23.18	29.97	36.59	43.07	49.43	55.70	61.89	68.00
E	6.45	11.98	17.21	22.26	27.18	31.99	36.71	41.37	45.96	50.50
F	4.34	8.06	11.59	14.99	18.30	21.54	24.72	27.85	30.94	34.00

Table A8. σ_z at different downwind distances, for various stability classes

Stability class	Downwind distance (m)									
	100	200	300	400	500	600	700	800	900	1000
A	14.32	28.66	51.86	83.72	124.07	172.81	229.86	295.12	368.54	450.07
B	10.86	20.07	30.03	40.50	51.37	62.57	74.06	85.79	97.75	109.90
C	7.49	14.08	20.37	26.47	32.44	38.30	44.08	49.78	55.42	61.00
D	4.55	8.64	12.17	15.39	18.39	21.22	23.94	26.54	29.06	31.50
E	3.49	6.36	8.78	10.95	12.95	14.83	16.60	18.30	19.93	21.50
F	2.26	4.01	5.54	6.93	8.24	9.48	10.67	11.82	12.92	14.00

Step 3: Model scenarios

For each future traffic volume two scenarios will be considered in order to calculate the expected CO concentrations. The first scenario (worst case scenario) will consider the minimum wind speed (1 m/sec) and the highest stability class (class F), in this scenario the dispersion coefficients will be minimum, thus higher ground level concentrations will be encountered. On the other hand, the second scenario will consider the maximum wind speed (4 m/sec) and the most unstable class (class A); this will represent a high degree of dispersion, therefore minimum ground level concentrations.

Step 4: Model application

Vehicle emissions were modeled using a line source Gaussian model (Figure A1) which is basically an infinite array of point sources.

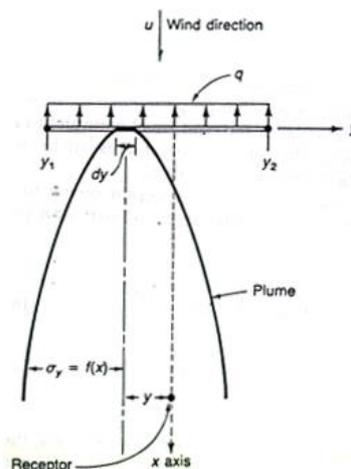


Figure A1. Finite line source Gaussian plume model

The general equation for a finite line source is:

$$C = \frac{q}{2\pi u \sigma_z \sigma_y} \left(\exp \frac{-(z-H)^2}{2\sigma_z^2} + \exp \frac{-(z+H)^2}{2\sigma_z^2} \right) \int_{y_1}^{y_2} \exp \left(-\frac{1}{2} \frac{y^2}{\sigma_y^2} \right) dy \quad (A2)$$

- Where,
- C = Concentration of pollutant ($\mu\text{g}/\text{m}^3$)
 - q = Uniform emission rate ($\mu\text{g}/\text{m}\text{-sec}$)
 - σ_z, σ_y = Dispersion coefficients
 - z = Receptor height (m)
 - H = Source height (m)
 - u = Wind speed (m/s)

For an infinite line source ($y_1 \rightarrow -\infty$ and $y_2 \rightarrow \infty$), ground level receptor ($z=0$), and $H=0$ (for most vehicles), equation A2 becomes:

$$C = \frac{2q}{\sqrt{2\pi}(u\sigma_z\sigma_y)} \quad (A3)$$

Figures A2 to A9 present the expected downwind CO concentrations during the operation phase of the four proposed roads for the years 2019 and 2039 under the typical and worst-case scenarios.

Figure. A2. CO concentrations at various downwind distances
Road 4 (Hourata Harisa) in 2019

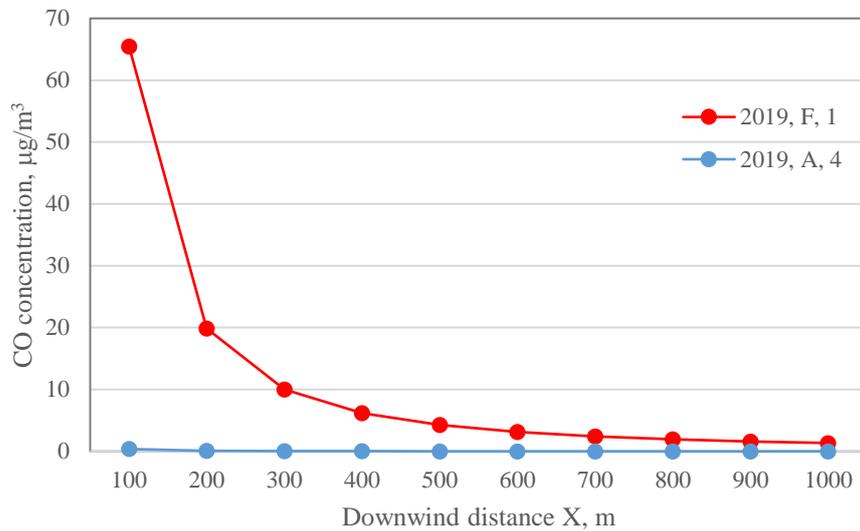


Figure. A3. CO concentrations at various downwind distances
Road 4 (Hourata Harisa) in 2039

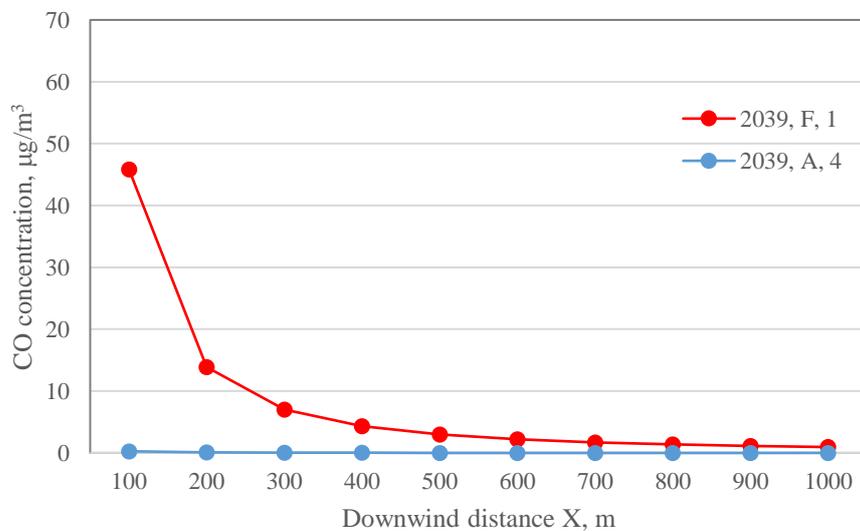


Figure. A4. CO concentrations at various downwind distances along Road 5 (Bassatin Al Ossi - Beit Chelala) in 2019

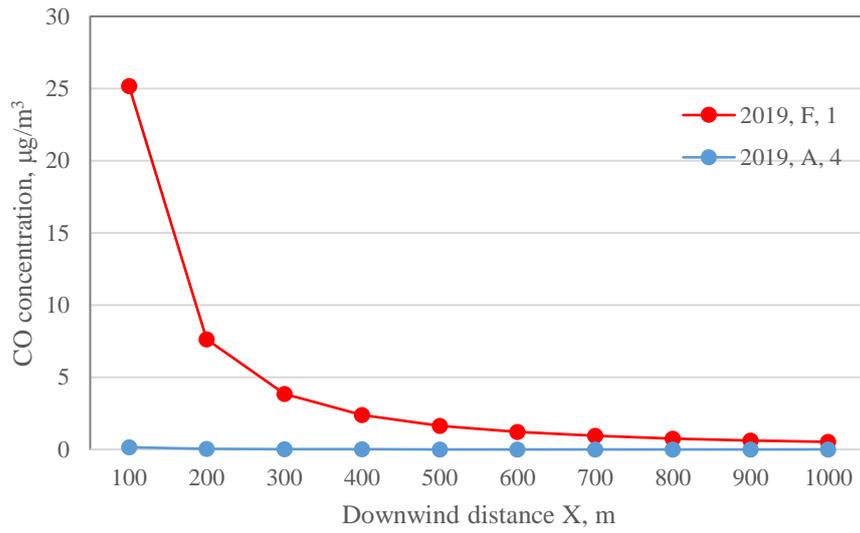


Figure. A5. CO concentrations at various downwind distances Road 5 (Bassatin Al Ossi - Beit Chelala) in 2039

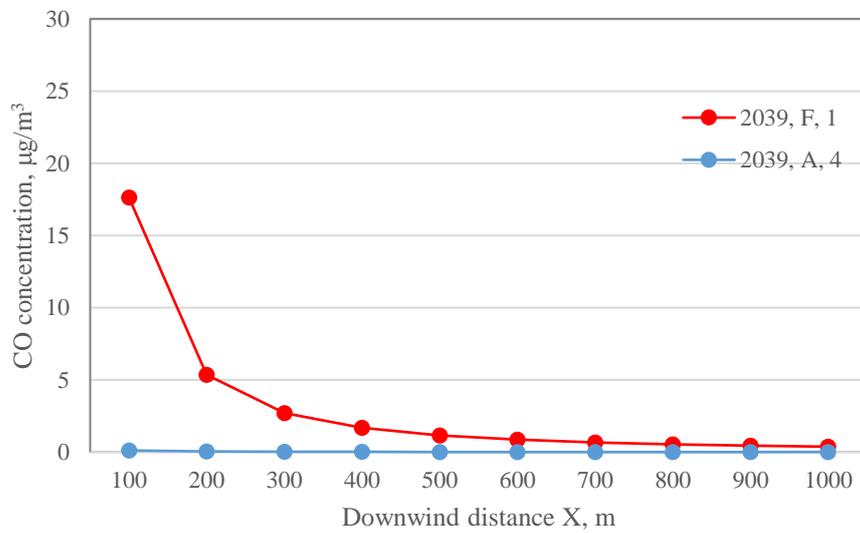


Figure. A6. CO concentrations at various downwind distances
Road 6 (Kour Zan Assia) in 2019

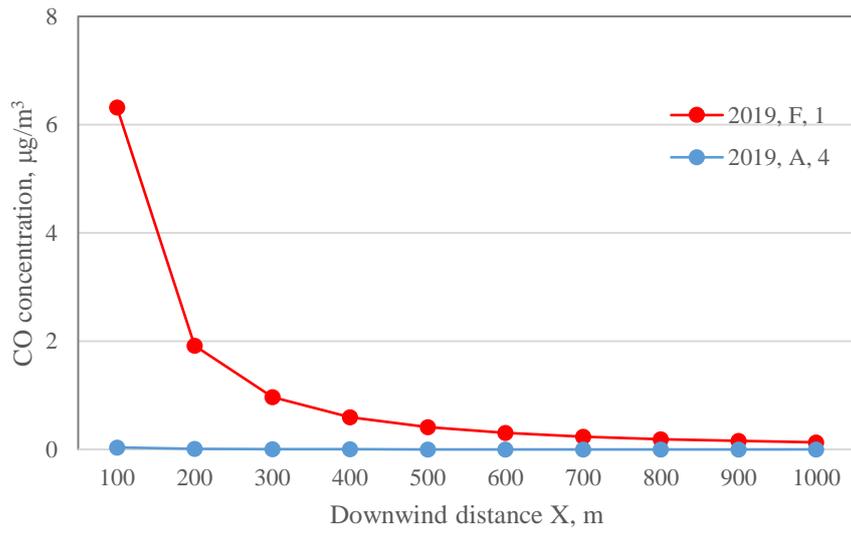


Figure. A7. CO concentrations at various downwind distances
Road 6 (Kour Zan Assia) in 2039

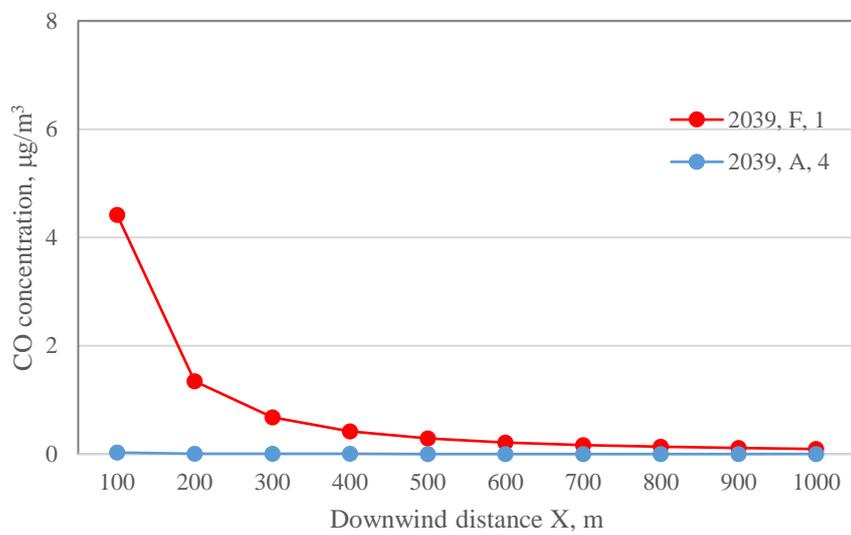


Figure. A8. CO concentrations at various downwind distances
Road 7N (Bassatin Al Ossi - Kfour Al Arabi) in 2019

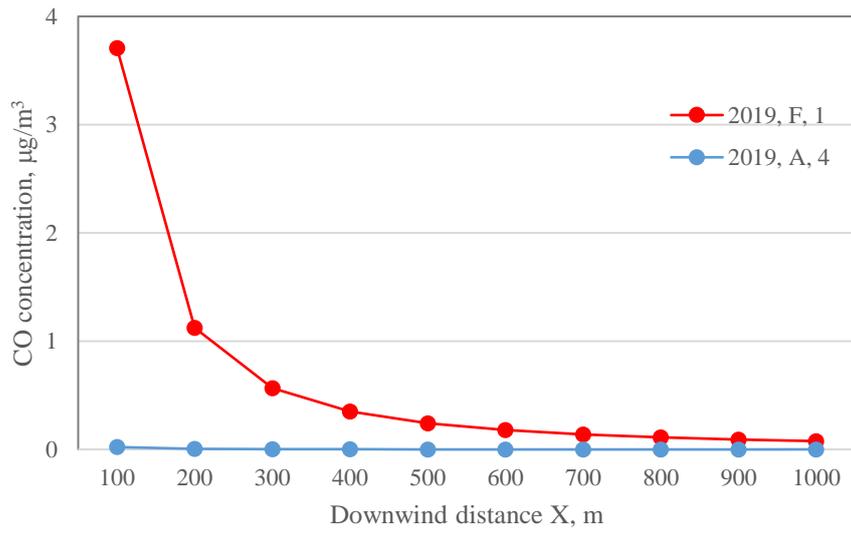
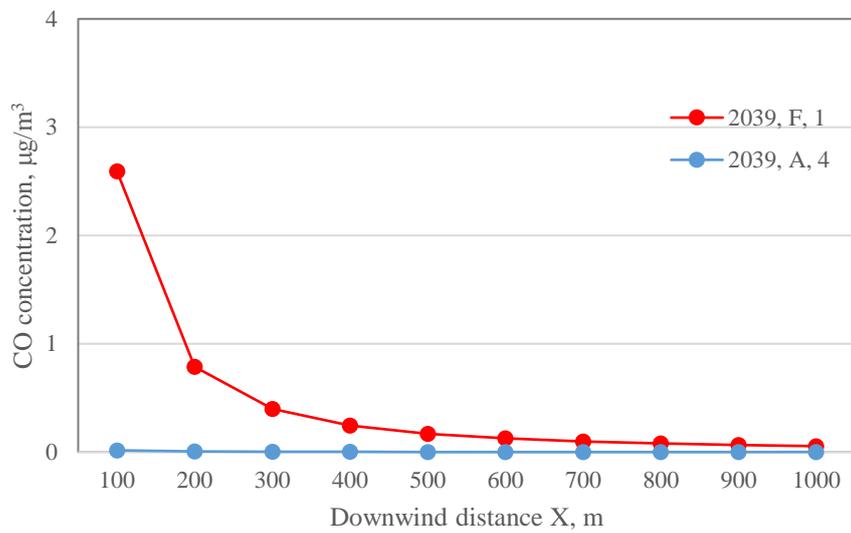


Figure. A9. CO concentrations at various downwind distances
Road 7N (Bassatin Al Ossi - Kfour Al Arabi) in 2039



Annex B – Typical methodology for estimating impact on noise levels

Construction phase

Noise levels during the construction phase are a function of the construction scheme and the machinery used on-site. Table B1 shows typical energy-equivalent noise levels associated with various work phases at a building construction site, when all pertinent equipment are present.

Table B1. Typical noise levels at construction sites (USEPA cited in Canter, 1996)

<i>Phase</i>	<i>Noise level (dBA)</i>
Ground clearing	84
Excavation	89
Foundations	78
Erection	87
Finishing	89

The first step in the noise quantification was the determination of the total site L_{eq} from various operations as expressed in Equation B1.

$$L_{eq} = 10 \text{Log} \left[\frac{1}{T} \sum_{i=1}^N T_i (10)^{L_i/10} \right] \quad (B1)$$

Where	L_i	$=$	L_{eq} for the i th phase (Table B1)
	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

Noise levels during the construction phase are a function of the construction scheme and the machinery used on-site. Table B1 shows typical energy-equivalent noise levels associated with various work phases at a road construction site, when all pertinent equipment is present.

Noise from construction operations is different from noise from other sources for two main reasons:

- ❑ It is caused by many types of equipment.
- ❑ The resulting adverse effects are temporary because the operations are relatively short term.

In order to assess the extent of potential noise impacts during the construction of the proposed REP, a noise model specific for construction operations was applied. It allows the preparation of sound contours for construction noise.

Taking into consideration the five construction phases listed in Table B1, with each having an estimated average duration of 1 week for a 500 m stretch of road, the total L_{eq} for the site was estimated at 80.8 dBA. This noise level is slightly above the maximum noise levels measured in the vicinity of the site (55-80 dBA). It exceeds both the IFC noise standard for residential areas (55 dBA) the FHWA standards for the Category B classified areas (67 dBA). However, this value was 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.

To determine the propagation of noise levels at various radial distances from the construction site, L_{eq} was corrected using Equation B2:

$$L_{eq, \text{adjusted}} = -20 \text{Log}(x + 250) + 48 \quad (B2)$$

The resulting noise levels at different radii away from the site are presented in Figure B1.

Figure B1. Noise levels at different radii around the site

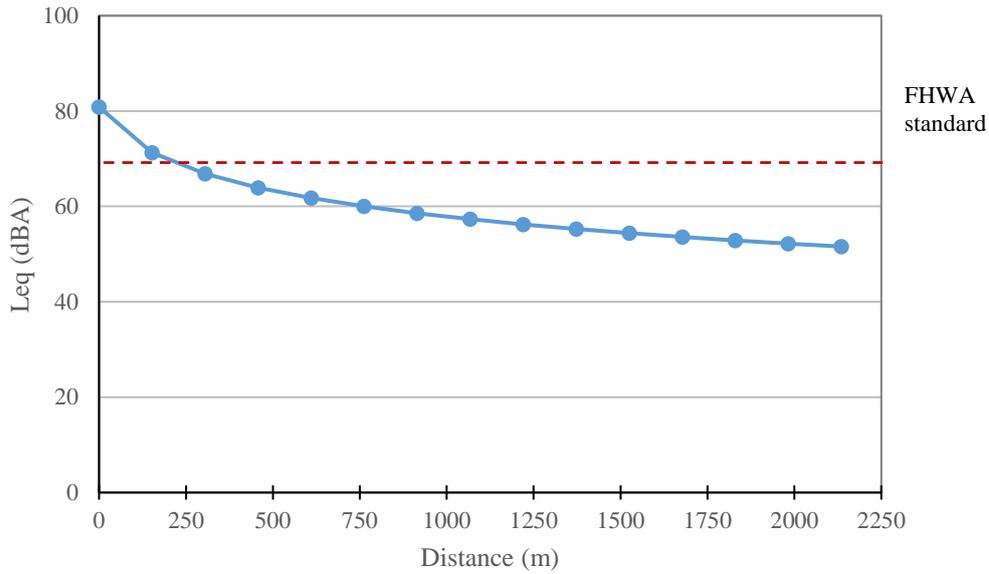
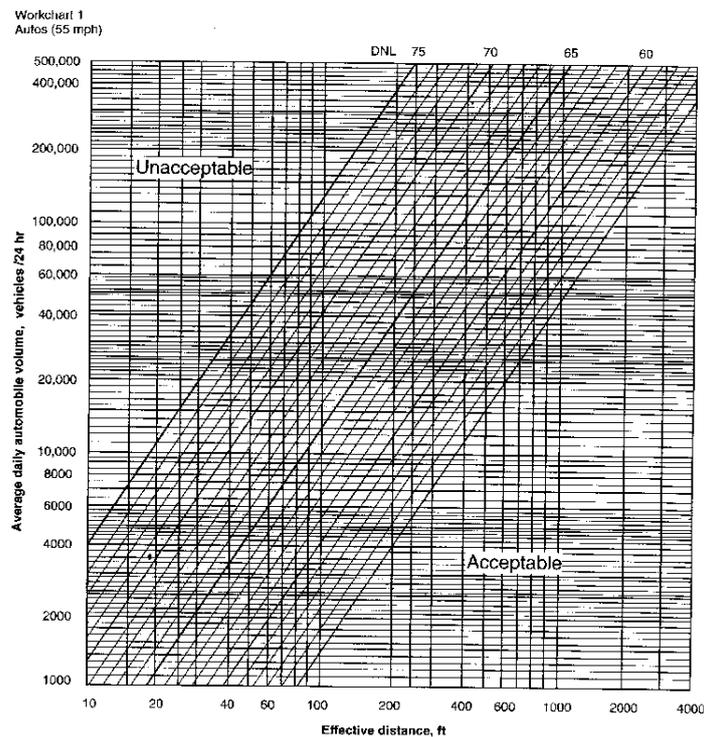


Figure B1 shows that the daytime Lebanese standard for rural areas (30-40 dBA) cannot be reached even at a radius of 2 km from the construction area. The FHWA standard (67 dBA), it is reached at a radius of 305 m.

Operation phase

At the operational level, noise levels at distances adjacent to roads can be estimated using Figure B2 by U.S. Department of Housing and Urban Development (Canter, 1996). The Day-Night Average Sound Level (DNL) noise metric is used to reflect a person's cumulative exposure to sound over a 24-hour period, expressed as the noise level for the average day of the year on the basis of annual vehicle operations. DNL is equivalent to Leq.

Figure B2. Typical noise levels adjacent to roads and highways



Annex C. CDR Safety, Health, and Environmental Regulations

STANDARD BIDDING DOCUMENTS

**Safety, Health and
Environmental
Regulations**

**Council for Development and Reconstruction
Beirut, Lebanon**

June 1996

t:\...bidding\sheregs.doc

Safety, Health and Environmental Regulations

**Council for Development and Reconstruction
Beirut, Lebanon**

Issue June 1996

Appendix 1

Safety, Health and Environmental Regulations

Table of Contents

Drafting Notes¹

Preamble

PART I - General Safety, Health and Environmental Regulations

PART II - Supplementary Safety, Health and Environment Regulations

¹ The reference to "Drafting Notes" should not be incorporated in the bidding documents; include following page.

Appendix 1

Safety, Health and Environmental Regulations

Table of Contents

Preamble

PART I - General Safety, Health and Environmental Regulations

PART II - Supplementary Safety, Health and Environment Regulations

Drafting Notes²

² These drafting notes are intended to assist those preparing the Safety, Health and Environmental Regulations. **These drafting notes should not be incorporated in the bidding documents.**

1 These CDR Safety ... Regs, Issue June 96 (c:\wp51\docs\Safety\CDRRRegs) can be used with all CDR Standard Conditions of Contract.

2 The CDR Safety, Health and Environmental Regulations are in two parts:

- PART I - General Safety, Health and Environmental Regulations;
- PART II - Supplementary Safety, Health and Environmental Regulations.

3 PART I, General Safety, Health and Environmental Regulations, together with the front cover page and pages i to iii, shall be included as printed, **without amendment**.

The pages of PART I are set up for, and should be photocopied on, double sided paper.

4 PART II, Supplementary Safety, Health and Environmental Regulations, will comprise changes, modifications and additional requirements to PART I, applicable to the Sector and/or the contract for which the Regulations are being prepared. PART II should be prepared by the Consultant responsible for preparation of the bidding documents in conjunction with the SIU.

PART II has priority over PART I (see Preamble).

If no changes, modifications or additional requirements are included in PART II, the page for PART II should be included with the addition of the following below the Table of Clauses:

"NONE"

The name of the contract should be added to the footer of pages, PART II.

5 In PART I, the amounts to be withheld in the event of non-compliance (Sub-Clause 3.2.2) are expressed in USD. PART II includes provision for contracts in currencies other than USD (eg Lebanese Pounds).

6 The Regulations should be included as Appendix 1 to the Conditions of Contract³.

Sample clause for inclusion in the Conditions of Contract³:

X Safety, Health and Environmental Regulations

X.X The Contractor shall comply with the requirements of CDR Safety, Health and Environment Regulations. The regulations and requirements, and specific measures and actions available to the Employer and the Engineer in the event of non-compliance by the Contractor, are attached as Appendix 1 to these Conditions of Contract.

³ The positioning and numbering of the above Clause varies according to the Conditions of Contract being

used:

- for CDR Integrated Conditions of Contract for Works of Civil Engineering Construction: Part I - Standard Conditions, Sub-Clause 19.1;
- for CDR Conditions of Contract for Works of a Civil Engineering Construction: Part II - Conditions of Particular Application, Sub-Clause 78.1;
- for CDR Standard Bidding Documents, Procurement of Works, Smaller Contracts: Section 3, Conditions of Contract, Clause 19.2.

For other Conditions of Contract the Sub-Clause should be positioned and numbered as appropriate.

7 Throughout the Regulations the term "Engineer" is used.

However, in the CDR Standard Bidding Documents, Procurement of Works, Smaller Contracts the term "Engineer" is replaced by "Project Manager".

When "Engineer" is used in the bidding documents, the first alternative page iii "Preamble" should be included. When "Project Manager" is used in the bidding documents, the second alternative page iii, "Preamble", should be included.

Preamble

The Safety, Health and Environmental Regulations are in two parts:

PART I - General Safety, Health and Environmental Regulations;

PART II - Supplementary Safety, Health and Environmental Regulations.

PART II shall have priority over PART I.

Preamble

The Safety, Health and Environmental Regulations are in two parts:

PART I - General Safety, Health and Environmental Regulations;

PART II - Supplementary Safety, Health and Environmental Regulations.

PART II shall have priority over PART I.

Whenever the term "Engineer" is used in these Safety, Health and Environmental Regulations, it shall be construed as meaning "Project Manager" as defined in the Conditions of Contract.

Part I

General Safety, Health and Environmental Regulations

Table of Clauses

1	Introduction	PI/3
2	Compliance with Regulations	PI/3
3	Failure to Comply with Regulations	PI/5
	3.1 General.....	PI/5
	3.2 Deductions from Payments.....	PI/5
4	General Requirements	PI/6
	4.1 Preamble.....	PI/6
	4.2 Safety Officer.....	PI/6
	4.3 Safety Training.....	PI/7
	4.4 Safety Meetings.....	PI/7
	4.5 Safety Inspections.....	PI/7
	4.6 Control of Substances Hazardous to Health.....	PI/7
	4.7 Potential Hazards.....	PI/7
	4.8 Accident Reporting.....	PI/8
	4.9 Notices, Signs, Etc.....	PI/8
	4.10 First Aid and Medical Attention.....	PI/8
	4.11 Employee Qualifications and Conduct.....	PI/9
5	Safety Requirements	PI/9
	5.1 Personal Protective Equipment.....	PI/9
	5.2 Fire Protection and Prevention.....	PI/10
	5.3 Electrical Safety.....	PI/11
	5.4 Oxygen/Acetylene/Fuel Gases/Cartridge Tools.....	PI/12
	5.5 Scaffolding/Temporary Works.....	PI/13
	5.6 Use of Ladders.....	PI/13
	5.7 Elevated Work.....	PI/14
	5.8 Use of Temporary Equipment.....	PI/15
	5.9 Locking-out, Isolating, and Tagging of Equipment.....	PI/16
	5.10 Installation of Temporary or Permanent Equipment.....	PI/17
	5.11 Laser Survey Instruments.....	PI/17
	5.12 Working in Confined Spaces.....	PI/17
	5.13 Demolition.....	PI/18
	5.14 Use of Explosives.....	PI/18
	5.15 Excavation and Trenching.....	PI/19
	5.16 Concrete Reinforcement Starter Bars.....	PI/20

6	Environmental and Health Requirements	PI/20
6.1	Protection of the Environment.....	PI/20
6.2	Air Pollution.....	PI/20
6.3	Water Pollution.....	PI/21
6.4	Solid Waste.....	PI/21
6.5	Noise Control.....	PI/22
7	Additional Requirements for Work in Public Areas	PI/23
7.1	General.....	PI/23
7.2	Method Statement.....	PI/23
7.3	Closure of Roads, Etc.....	PI/24
7.4	Trench and Other Excavations.....	PI/24
7.5	Safety Barriers.....	PI/25
8	Contractor's Site Check List	PI/26

Annex 1 Sample Excavation Permit

Annex 2 Sample Street Closure Permit

Annex 3 Sample Contractor's Site Check List

Part I

General Safety, Health and Environmental Regulations

1 Introduction

- 1.1 The prevention of injury and/or illness to site personnel and the public, damage to the Works and to public and private property, protection of the environment, and compliance with applicable laws, are primary objectives of CDR (the Employer). Because of the importance CDR places on meeting these objectives, selected minimum requirements are outlined in these Safety, Health and Environmental Regulations with which Contractors shall comply while working on CDR contracts. Given that these Regulations cannot cover every eventuality, the Contractor shall be expected to exercise good judgement in all such matters, even though not mentioned in these Regulations, and shall take any and all additional measures, as required or necessary, to meet his responsibility for safety, health and environmental matters during the period of the Contract.

CDR and its representatives shall not be held liable for any actions taken by the Contractor that are attributed to following the minimum requirements stated hereinafter.

- 1.2 The Contractor shall, throughout the execution and completion of the Works and the remedying of any defects therein:
- (a) have full regard for the safety of all persons on the Site and keep the Site and the Works in an orderly state appropriate to the avoidance of danger to any person;
 - (b) know and understand all laws governing his activities along with any site requirements and work site hazards. Such information shall be communicated by the Contractor to his personnel and subcontractors;
 - (c) take all necessary measures to protect his personnel, the Employer's personnel, other persons, the general public and the environment;
 - (d) avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of carrying out the Works.

2 Compliance with Regulations

- 2.1 The Contractor shall comply with the requirements of these Safety, Health and Environmental Regulations and all other applicable regulations or requirements under Lebanese laws, laid down by relevant authorities or issued by the Employer or the Engineer concerning safety, health and the environment, in force or introduced or issued from time to time during the period of the Contract.

In so far as these Regulations are applicable, they shall apply to sites and personnel outside the Site associated with the performance of the Contract.

- 2.2 The Regulations equally apply to subcontractors and all other parties engaged by the Contractor and their personnel. The Contractor shall ensure all such parties are fully aware of and comply with the Regulations.
- 2.3 The Contractor shall comply with all notifications and written or verbal instruction regarding safety issued pursuant to these Regulations by the Employer, Engineer or relevant authorities within the time specified in the notification or instruction.

Whenever the Contractor is required to obtain the approval, agreement, permission, etc of the Engineer, such approval, agreement, permission, etc shall not relieve the Contractor of his responsibilities and obligations under these Regulations or the Contract.

- 2.4 The Contractor shall adopt a positive approach, awareness and responsibility towards safety, health and the environment, and take appropriate action, by:
- (a) ensuring the Regulations are enforced and followed by the Contractor's personnel. Any failure by the Contractor's personnel to follow the Regulations, shall be regarded as a failure by the Contractor.
 - (b) paying attention to possible injury to unauthorised persons entering the site, particularly children.

- 2.5 Whenever in these Regulations the Contractor is required to provide test certificates for equipment and personnel or to comply the relevant authorities' requirements and no independent test facilities are available or no relevant authorities exist in Lebanon, the Contractor shall provide:

- a) in lieu of independent test certificates:
 - for equipment - details of the tests and the date of the tests that have been carried out by the Contractor and a written statement that the Contractor has satisfied himself that the item of equipment is fit and safe for use;
 - for personnel - details of the training and experience and a written statement that the Contractor has satisfied himself that the person has the required level of competency;
- b) in lieu of relevant authorities' requirements - details of the Contractor's own rules, regulations, requirements and procedures regarding safety, health and the environment.

If the Engineer is dissatisfied with the details provided by the Contractor, the Contractor shall provide further details or carry out further tests or provide further written statements as may be reasonably required by the Engineer.

When the Engineer has satisfied himself regarding the Contractor's own rules, regulations, requirements and procedures provided in accordance with (b) above, such rules, etc shall be deemed to form part of these Regulations and to which Clause 3 shall equally apply.

3 Failure to Comply with Regulations

3.1 General

3.1.1 Should the Contractor fail to comply with any of the Regulations or requirements:

- (a) the Engineer may suspend the Works or part of the Works until the Contractor has taken necessary steps, to the satisfaction of the Engineer, to comply with the regulations or requirements.
- (b) the Employer may, following written notice to the Contractor, carry out themselves or arrange for another contractor to carry out such measures as they consider appropriate on behalf of the Contractor. Any such actions by the Employer shall not affect or diminish the Contractor's obligations or responsibilities under the Contract.
- (c) the Engineer may, following written notice to the Contractor, deduct from payments to the Contractor the amounts stipulated in Sub-Clause 3.2. Such notice shall specify:
 - (i) the nature of the failure or failures;
 - (ii) the period after the date of the notice within which the Contractor shall remedy each failure; and
 - (iii) the amount to be deducted.

Such suspension of payment will remain in force until such time as the Contractor has rectified the breach or breaches to the satisfaction of the Engineer. No interest shall be paid on the suspended payments.

3.1.2 Failure to comply with the Regulations or requirements shall be considered a breach of contract by the Contractor and may result in termination of the Contract by the Employer.

3.1.3 In the event of the Employer or Engineer taking action based on Sub-Clause 3.1.1(a) or (b) or 3.1.2, the Contractor shall not be entitled to any additional costs or extension to the Contract Completion Date.

3.1.4 All costs incurred by the Employer pursuant to Sub-Clause 3.1.1(b) and the deductions from payments imposed on the Contractor by the Engineer under Sub-Clause 3.1.1(c) shall be deducted from amounts otherwise due to the Contractor.

3.2 Deductions from Payments

3.2.1 Failures by the Contractor to comply with the Regulations or requirements are classified as follows:

D1 - breaches of Sub-Clause 5.6 (personal protective equipment);
D2 - breaches of Clause 7 (work in Public Areas);
D3 - breaches other than D1 and D2.

3.2.2 The basic deduction from payment for each classification in Sub-Clause 3.2.1, is as follows:

for D1 - \$2000;
for D2 - \$10000;
for D3 - \$5000.

3.2.3 Deductions from payments will be applied as follows:

- (a) for the first breach of each regulation or requirement - the basic deduction. If the same or similar breaches occur in different situations or locations at the same time, the Engineer may apply deductions for each situation or location; this will not apply to breaches related to personal protective equipment.
- (b) for a second or subsequent breach of the same Regulation or requirement or failure to rectify a previous failure within the time specified by the Engineer - twice the basic deduction.

4 General Requirements

4.1 Preamble

4.1.1 All references to safety shall be deemed to include health and the environment.

4.2 Safety Officer

4.2.1 The Contractor shall appoint a competent Safety Officer who shall be responsible for safety, health and the environment. The Safety Officer shall be given sufficient time by the Contractor to carry out his duties; minimum requirements shall be as follows:

Workforce on Site of over 250	-	full time Safety Officer;
Workforce on Site of 100-250	-	50% of Safety Officer's time;
Workforce on Site below 100	-	as required for the Works but a minimum of 5 hours per week of Safety Officer's time where more than 20 workers.

4.2.2 The Contractor shall provide the Safety Officer with appropriate identification, including a white hard hat with red cross symbol and a identification badge. The appointment of the Safety Officer shall be in writing and copied to the Engineer. The appointment shall include specific instructions to enforce these Regulations and delegated authority to take any action, measure or to issue instructions regarding their enforcement. All persons on Site shall be made aware of the name and authority of the Safety Officer and instructed to comply with any instruction or direction on safety matters, verbal or in writing, issued by the Safety Officer.

4.2.3 The Safety Officer shall be provided with a mobile phone or other similar means of communication. The Safety Officer shall be accessible and available at all times including outside normal working hours.

4.3 Safety Training

4.3.1 The Contractor shall provide safety induction training for all site personnel upon starting on site.

4.3.2 The Contractor shall provide safety refresher/reinforcement training at regular intervals for his staff.

4.4 Safety Meetings

4.4.1 The Contractor shall hold regular safety meetings to provide safety instructions and receive feedback from site personnel on safety, health and environmental matters. A weekly Safety Meeting shall be chaired by the Safety Officer and minutes shall be taken of the meeting. The meeting/minutes shall cover all relevant issues including actions to be taken. A copy of the minutes shall be given to the Engineer. The Safety Officer should attend the Contractor's weekly site meetings and "Safety" should be an item on the agenda.

4.5 Safety Inspections

4.5.1 The Safety Officer shall make regular safety inspections of the work site. The Safety Officer shall prepare a report of each inspection. This report shall include details of all breaches of these Regulations and any other matters or situations relating to safety found during the inspection, instructions issued by the Safety Officer and actions taken by the Contractor. A copy of the Safety Officer's inspection reports shall be given to the Engineer.

4.6 Control of Substances Hazardous to Health

4.6.1 Hazardous materials shall be stored in approved safety containers and handled in a manner specified by the manufactures and/or prescribed by relevant Authorities (see Sub-Clause 2.5).

4.6.2 Only properly trained and equipped personnel shall handle hazardous materials.

4.7 Potential Hazards

4.7.1 The Contractor shall inform employees of potential hazards, take appropriate steps to reduce hazards and be prepared for emergency situations.

4.7.2 The Contractor shall make an assessment of every operation involving hazardous substances. The assessment shall be recorded on a Hazardous and Flammable Substances Assessment Method Statement which shall be submitted to the Engineer prior to the delivery and use of the substance on Site.

4.8 Accident Reporting

4.8.1 The Contractor shall report all accidents and dangerous occurrences to the Engineer. The Contractor shall prepare a report on each accident or dangerous occurrence and a copy of the

report, together with witness statements and any other relevant information, shall be submitted to the Engineer. A reportable accident or dangerous occurrence shall include any accident to any person on Site requiring medical attention or resulting in the loss of working hours or any incident that resulted, or could have resulted, in injury, damage or a danger to the Works, persons, property or the environment.

- 4.8.2 In the event of an accident or dangerous occurrence, the Contractor shall be responsible for completing all statutory notifications and reports. Copies of all statutory notifications and reports shall be passed to the Engineer.
- 4.8.3 All accidents and dangerous occurrences shall be recorded in a Site Accident Book. The Site Accident Book shall be available at all times for inspection by the Engineer.
- 4.8.3 The Contractor shall immediately rectify any situation or condition that could result in injury, damage or a danger to the Works, person, property or the environment. If the situation or condition cannot be corrected immediately, the Contractor shall provide temporary barriers and appropriate warning signs and devices and/or take other appropriate action necessary for the protection of persons, property and the environment.

4.9 Notices, Signs, Etc

- 4.9.1 All safety, health, environmental and other notices and signs shall be clearly displayed and written in both Arabic and either English or French. All requirements, instructions, procedures, etc issued by the Contractor concerning these Regulations shall be printed in both Arabic and English and displayed and readily available to Contractor's personnel.

4.10 First Aid and Medical Attention

- 4.10.1 The Contractor shall have comprehensive First Aid Kit(s) on Site at all times. First Aid Kits shall be conveniently located and clearly identifiable.
- 4.10.2 The Contractor shall have one employee on site trained in first aid for every 25 employees. Such persons shall be provided with appropriate identification, including a red hard hat with a white "red cross" symbol and a identification badge.
- 4.10.3 The Contractor shall make contingency arrangements for calling a Doctor and transporting injured persons to hospital. The telephone numbers of the emergency services and the name, address and telephone number of the Doctor and nearest hospital shall be prominently displayed in the Contractor's site office.

4.11 Employee Qualifications and Conduct

- 4.11.1 The Contractor shall employ only persons who are fit, qualified and skilled in the work to be performed. All persons shall be above the minimum working age.
- 4.11.2 Contractor's personnel shall use the toilet facilities provided by the Contractor.
- 4.11.3 The Contractor shall ensure:
- (a) that no firearms, weapons, controlled or illegal substances or alcoholic beverages are brought onto the Site and that no personnel under the influence of alcohol or drugs are permitted on Site.
 - (b) that all personnel obey warning signs, product or process labels and posted instructions.
 - (c) that drivers or operators of vehicles, machinery, plant and equipment follow the rules for safe operations. Drivers shall wear seat belts and obey all signs and posted speed limits.

5 Safety Requirements**5.1 Personal Protective Equipment**

- 5.1.1 The Contractor shall provide personal protective equipment, including hard hats, safety glasses, respirators, gloves, safety shoes, and such other equipment as required, and shall take all measures or actions for the protection and safety of Contractor's personnel.
- 5.1.2 Non-metallic hard hats shall be worn at all times by all personnel at the worksite with the exception of those areas where the Engineer has indicated it is not necessary to do so.
- 5.1.3 Safety glasses shall meet international standards and be available for use and worn in specified worksite areas. As a minimum, safety glasses shall be worn for the following types of work: hammering, chipping, welding, grinding, use of electrically powered or pneumatic equipment, insulation handling, spray painting, working with solvents, and other jobs where the potential of an eye injury exists. Face shields and/or monogoggles shall be worn where possible exposure to hazardous chemicals, cryogenic fluids, acids, caustics, or dust exists and where safety glasses may not provide adequate protection.
- 5.1.4 When handling acids, caustics, and chemicals with corrosive or toxic properties, suitable protection, such as acid suits or chemical resistant aprons and gloves, shall be worn to prevent accidental contact with the substance.
- 5.1.5 Personnel shall not be permitted to work whilst wearing personal clothing or footwear likely to be hazardous to themselves or others.
- 5.1.6 The wearing of safety shoes with steel reinforced toes is recommended for all Contractor's personnel on site. In all cases, Contractor's personnel shall wear substantial work shoes that are commensurate with the hazards of the work and the worksite area.

- 5.1.7 Hearing protection, including muffs, plugs or a combination thereof, shall be provided for all personnel operating in areas where the noise level exceeds 90 decibels. Such protection shall also be provided for operators working with equipment exceeding such a level. This may include equipment such as excavators, shovels, jackhammers, saws, drills, grinders, and the like are being used.
- 5.1.8 The Contractor shall encourage employees to wear substantial work gloves whenever practical and safe to do so.

5.2 Fire Protection and Prevention

- 5.2.1 The Contractor shall comply with fire protection instructions given by the Authorities having jurisdiction in regard to fire protection regulations.
- 5.2.2 The Contractor shall, upon moving on site, provide to the Engineer and the Authorities a fire prevention and evacuation plan. This shall include drawing(s) showing the fire assembly points. The fire prevention and evacuation plan and drawing(s) shall be updated from time to time as the Works progress. The Contractor shall ensure all personnel are fully informed on escape routes and assembly points and any changes thereto.
- 5.2.3 Fuel storage will not be permitted in construction work areas. Contractors may establish fuel storage tanks in special areas set aside for the purpose and approved by the Engineer. Storage tanks shall be adequately banded to control spillage. Fire extinguishers shall be provided and installed in a suitable nearby location.
- 5.2.4 Highly combustible or volatile materials shall be stored separately from other materials and as prescribed by relevant authorities and under no circumstances within buildings or structures forming part of the permanent Works. All such materials shall be protected and not exposed to open flame or other situations which could result in a fire risk.
- 5.2.5 No combustible site accommodation shall be located inside or within 10 metres of a building or structure forming part of the permanent Works. Where units have to be used in these circumstances, they shall be constructed of non-combustible materials and have a half-hour fire rating inside to outside and outside to inside. Non-combustible furniture shall be used where practical.
- 5.2.6 All temporary accommodation and stores shall be provided with smoke detectors and fire alarms.
- 5.2.7 Smoking shall be banned in high risk areas.
- 5.2.8 Expanded polystyrene with or without flame retarding additive, polythene, cardboard and hardboard shall not be used as protection materials.
- 5.2.9 Plywood and chipboard shall only be used as protection on floors. Vertical protection shall be non-combustible. Debris netting and weather protection sheeting shall be fire retardant.
- 5.2.10 When using cutting or welding torches or other equipment with an open flame, the Contractor shall provide a fire extinguisher close by at all times. All flammable material shall be cleared

from areas of hot works, or work locations prior to welding or oxy/gas burning operations. All hot works shall cease half an hour before the end of a work shift to allow for thorough checking for fires or smouldering materials. Where appropriate, areas of hot works are to be doused in water before the shift ends.

- 5.2.11 An adequate number of fire extinguishers of types suited to the fire risk and the materials exposed shall be provided. These shall be placed in accessible, well-marked locations throughout the job site. Contractor's personnel shall be trained in their use. Extinguishers shall be checked monthly for service condition and replaced or recharged, as appropriate after use.
- 5.2.12 Only approved containers shall be used for the storage, transport and dispensing of flammable substances. Portable containers used for transporting or transferring gasoline or other flammable liquids shall be approved safety cans.
- 5.2.13 Fuel burning engines shall be shut off while being refuelled.
- 5.2.14 Adequate ventilation to prevent an accumulation of flammable vapours shall be provided where solvents or volatile cleaning agents are used.
- 5.2.15 Flammables shall not be stored under overhead pipelines, cable trays, electrical wires, or stairways used for emergency egress.
- 5.2.16 Paints shall be stored and mixed in a room assigned for the purpose. This room shall be kept under lock and key.
- 5.2.17 Oily waste, rags and any other such combustible materials shall be stored in proper metal containers with self-closing lids and removed every night to a safe area or off site. Every precaution shall be taken to prevent spontaneous combustion.

5.3 Electrical Safety

- 5.3.1 All temporary electrical installations, tools and equipment shall comply with current regulations dealing with on-site electrical installations.
- 5.3.2 The Contractor shall establish a permit-to-work system for work on or in proximity to energized circuits of any voltage. Contractor's personnel shall not commence work on such circuits unless a permit to work has been issued and adequate safety measures have been taken and the work operation has been reviewed and approved by the Engineer.
- 5.3.3 Only authorised personnel shall be allowed to work or repair electrical installations and equipment.
- 5.3.4 Portable tools and equipment shall be 110 volt, unless otherwise agreed by the Engineer.

- 5.3.5 When portable or semi-mobile equipment operates at voltages in excess of 110 volts, the supply shall be protected by a Residual Current Device (RCD) regardless of any such device fitted to the equipment. The RCD must have a tripping characteristic of 30 milliamps at 30 milliseconds maximum.
- 5.3.6 All static electrically powered equipment, including motors, transformers, generators, welders, and other machinery, shall be properly earthed, insulated, and/or protected by a ground fault interruption device. In addition, the skin of metal buildings and trailers with electric service shall be earthed. Metal steps, when used, shall be securely fixed to the trailer.
- 5.3.7 Lampholders on festoon lighting shall be moulded to flexible cable and be of the screw in type. Clip on guards shall be fitted to each lamp unit.
- 5.3.8 All tungsten-halogen lamps shall be fitted with a glass guard to the element. These lamps must be permanently fixed at high level.
- 5.3.9 Electrical equipment shall be periodically inspected and repaired as necessary by competent persons.
- 5.3.10 Any work on electrical equipment and systems shall be made safe through locking, tagging, and/or isolation of the equipment before work commences. Prior to the start of the work, the equipment or systems shall be tested to insure that they have been properly de-energized and isolated.
- 5.3.11 Electrical repair work on energized systems shall be avoided whenever possible.
- 5.3.12 Electrical trouble shooting shall be conducted only after getting written approval of the Engineer.
- 5.3.13 Unauthorized personnel shall not enter enclosures or areas containing high voltage equipment such as switch gear, transformers, or substations.

5.4 Oxygen/Acetylene/Fuel Gases/Cartridge Tools

- 5.4.1 Compressed oxygen shall never be used in the place of compressed air.
- 5.4.2 Flash-back (Spark) arrestors shall be fitted to all gas equipment.
- 5.4.3 Liquid Petroleum Gas (LPG) cylinders shall not be stored or left in areas below ground level overnight. Cylinders must be stored upright.
- 5.4.4 The quantity of oxygen, acetylene and LPG cylinders at the point of work shall be restricted to a maximum of one day's supply. Cylinders shall be kept in upright vertical rack containers or be safely secured to a vertical support.
- 5.4.5 Cartridge tools shall be of the low velocity type. Operators must have received adequate training in the safe use and operation of the tool to be used.

5.5 Scaffolding/Temporary Works

- 5.5.1 No aluminum tube shall be used, except for proprietary mobile towers, unless otherwise agreed with the Engineer.
- 5.5.2 Drawings and calculations shall be submitted to the Engineer, prior to commencement of work on site, for all Temporary Works, including excavations, falsework, tower cranes, hoists, services and scaffolding. Design shall conform to international standards.
- 5.5.3 The Engineer will not approve Temporary Work designs but the Contractor shall take account of any comments on such designs made by the Engineer.
- 5.5.4 The Contractor shall inspect and approve all Temporary Works after erection and before access, loading or use is allowed. Completed and approved Temporary Works shall be tagged with a scaff-tag or similar safety system and the Safe Structure insert displayed. For scaffolding, one tag shall be displayed every 32 m² of face area. A central record system shall be kept on all Temporary Work. Temporary Works shall be inspected weekly and similarly recorded.
- 5.5.5 All mobile scaffold towers shall be erected in accordance with the manufacture's instructions and a copy of these shall be submitted to the Engineer prior to any use on site. Additionally, all towers shall be erected complete with access ladder, safety rails and kick boards whatever the height.
- 5.5.6 The Contractor shall repair or replace, immediately, any scaffold including accessories, damaged or weakened from any cause.
- 5.5.7 The Contractor shall ensure that any slippery conditions on scaffolds are eliminated as soon as possible after they occur.
- 5.5.8 All scaffolds used for storing materials, for brick or block laying, for access to formwork or for any other purpose where materials may accidentally fall, shall be provided with wire mesh guards or guards of a substantial material, in addition to kick boards.

5.6 Use of Ladders

- 5.6.1 Manufactured ladders shall meet the applicable safety codes for wood or metal ladders. Metal ladders shall not be used where there is any likelihood of contact with electric cables and equipment. All metal ladders shall be clearly marked: "Caution - Do not use around electrical equipment".
- 5.6.2 Job made ladders shall not be permitted.
- 5.6.3 Extension or straight ladders shall be equipped with non-skid safety feet, and shall be no more than 12 m in height. The maximum height of a step ladder shall be 2 m. Ladders shall not be used as platforms or scaffold planks.
- 5.6.4 Ladders rungs and steps shall be kept clean and free of grease and oil.
- 5.6.5 Extension and straight ladders shall be tied off at the top and/or bottom when in use. Only one person shall be allowed on a ladder at a time.

5.6.6 Defective ladders shall be taken out of service and not used. Ladders shall not be painted and shall be inspected for defects prior to use.

5.7 Elevated Work

5.7.1 The Contractor shall provide all personnel, while working at an elevated position, with adequate protection from falls. Details of such protection shall be submitted to and approved by the Engineer.

5.7.2 The Contractor shall carry out daily inspections of all elevated work platforms. Defects shall be corrected prior to use.

5.7.3 Roofing & Sheet Material Laying

(a) A Method Statement detailing the procedures to be adopted shall be submitted to and agreed with the Engineer prior to commencement of work on site.

(b) Mobile elevating work platforms or the equivalent shall be used to install roofing and sheet materials wherever practicable and a suitable base is available.

5.7.4 Erection of Structures

(a) A Method Statement detailing the procedures to be adopted shall be submitted and agreed with the Engineer prior to commencement of work on site.

(b) Safety harnesses and lines shall be provided by the Contractor for use by the erection personnel and worn at all times.

(c) Mobile elevating work platforms or the equivalent shall be used to erect structures wherever practicable and a suitable base is available.

5.7.5 Mobile Elevating Work Platforms

Operators shall be trained in the safe use of such platforms and hold a current Certificate of Competence (see Sub-Clause 2.5).

5.7.6 Hoists

(a) A copy of the current Test Certificate (see Sub-Clause 2.5) shall be submitted to the Engineer before any hoist (personnel or material) is brought into operation on the site. Where the range of travel is increased or reduced a copy of the revised Test Certificate shall be submitted.

(b) Each landing gate shall be fitted with a mechanical or electrical interlock to prevent movement of the hoist when any such gate is in the open position.

(c) Safety harnesses must be worn and used by personnel erecting, altering and dismantling hoists.

5.7.7 Suspended Cradles

- (a) Suspended cradles shall be installed, moved and dismantled by a specialist contractor.
- (b) Suspended cradles shall comply with local regulations.
- (c) All powered suspended cradles shall incorporate independent safety lines to overspeed braking devices and independent suspension lines for personal safety harness attachment.

5.8 Use of Temporary Equipment

- 5.8.1 The safe design capacity of any piece of equipment shall not be exceeded, nor shall the equipment be modified in any manner that alters the original factor of safety or capacity.
- 5.8.2 Mobile equipment shall be fitted with suitable alarm and motion sensing devices, including backup alarm, when required.
- 5.8.3 The Contractor shall ensure that the installation and use of equipment are in accordance with the safety rules and recommendations laid down by the manufacturer, taking into account the other installations already in place or to be installed in the future.
- 5.8.4 The Contractor shall inspect Equipment prior to its use on the Works and periodically thereafter to ensure that it is in safe working order. Special attention shall be given to such items as cables, hoses, guards, booms, blocks, hooks and safety devices. Equipment found to be defective shall not be used and immediately removed from service, and a warning tag attached.
- 5.8.5 Natural and synthetic fibre rope made of material such as manila, nylon, polyester, or polypropylene shall not be used as slings if approved by the Engineer.
- 5.8.6 Only trained, qualified and authorized personnel shall operate equipment. All drivers and operators shall hold a current Certificate of Training Achievement for the equipment being used (see Sub-Clause 2.5).
- 5.8.7 A safety observer shall be assigned to watch movements of heavy mobile equipment where hazards may exist to other personnel from the movement of such equipment, or where equipment could hit overhead lines or structures. The observer shall also ensure that people are kept clear of mobile equipment and suspended loads.
- 5.8.8 When mobile or heavy equipment is travelling onto a public thoroughfare or roadway, a flagman shall insure that traffic has been stopped prior to such equipment proceeding. While the mobile or heavy equipment is travelling on a public roadway, a trailing escort vehicle with a sign warning of a slow-moving vehicle that is dangerous to pass shall be provided.
- 5.8.9 Cranes:

- (a) The Contractor shall give a minimum of 48 hours notice to the Engineer prior to bringing a mobile crane on site.
- (b) No cranes shall be erected on the site without the prior approval of the Engineer. The Engineer may direct the Contractor as to locations where cranes may not be located. The Contractor shall take such directions into account when submitting his proposals for crane location points, base footings, pick up points and swing radius. Compliance with any such direction shall not entitle the Contractor to any extension of the Period of Completion or to any increase in the Contract Price.
- (c) Safety harnesses shall be worn and used at all times by personnel engaged on the erection, alterations and dismantling of tower cranes.
- (d) The Contractor shall provide a copy of the current Test Certificate (see Sub-Clause 2.5) to the Engineer before any crane (tower or mobile) is brought into operation on the Site.
- (e) All lifting tackle must hold a current Test Certificate (see Sub-Clause 2.5). All lifting tackle must be thoroughly examined every 6 months and an inspection report raised.
- (f) All fibrous/web slings shall be destroyed and replaced 6 months after first use.
- (g) All crane drivers/operators shall hold a Certificate of Training Achievement for the class of crane operated (see Sub-Clause 2.5).
- (h) All banksman/slingers shall hold a Training Certificate from a recognized training agency (see Sub-Clause 2.5).
- (i) Only certified slingers/banksmen shall sling loads or guide crane/load movement.
- (j) The maximum weekly working hours of a crane driver or banksman shall be restricted to 60 hours.
- (k) Under no circumstances, shall a crane or load come within 4 m of any energized overhead power line or other critical structure.

5.9 Locking-out, Isolating, and Tagging of Equipment

- 5.9.1 Equipment that could present a hazard to personnel if accidentally activated during the performance of installation, repair, alteration, cleaning, or inspection work shall be made inoperable and free of stored energy and/or material prior to the start of work. Such equipment shall include circuit breakers, compressors, conveyors, elevators, machine tools, pipelines, pumps, valves, and similar equipment.
- 5.9.2 Where equipment is subject to unexpected external physical movement such as rotating, turning, dropping, falling, rolling, sliding, etc., mechanical and/or structural constraints shall be applied to prevent such movement.

5.9.3 Equipment which has been locked-out, immobilized, or taken out of service for repair or because of a potentially hazardous condition shall be appropriately tagged indicating the reason it has been isolated and/or taken out of service.

5.9.4 Where safety locks are used for locking out or isolating equipment, the lock shall be specially identified and easily recognized as a safety lock.

5.10 Installation of Temporary or Permanent Equipment

5.10.1 During installation and testing the Contractor's specialist engineer shall be in attendance.

5.10.2 All control mechanism panel and wiring diagrams shall be available and printed in both Arabic and either English or French.

5.11 Laser Survey Instruments

5.11.1 Details of the types and use of laser instruments shall be submitted and agreed with the Engineer.

5.12 Working in Confined Spaces

5.12.1 Confined spaces, including tanks, vessels, containers, pits, bins, vaults, tunnels, shafts, trenches, ventilation ducts, or other enclosures where known or potential hazards may exist, shall not be entered without prior inspection by and authorisation from the Site Safety Officer and the issuance of a Hazardous Work Permit.

5.12.2 Prior to entering the confined space, the area shall be completely isolated to prevent the entry of any hazardous substances or materials which could cause an oxygen deficient atmosphere. All equipment that could become energized or mobilized shall be physically restrained and tagged. All lines going into the confined space shall be isolated and/or blanked.

5.12.3 Personnel working in a confined space where emergency escape or rescue could be difficult, shall wear a safety harness attached to a lifeline.

5.12.4 A qualified attendant(s), trained and knowledgeable in job-related emergency procedures, shall be present at all times while persons are working within the confined space. The attendant shall be capable of effecting a rescue, have necessary rescue equipment immediately available, and be equipped with at least the same protective equipment as the person making entry.

5.12.5 All equipment to be used in a confined space shall be inspected to determine its acceptability for use. Where a hazard from electricity may exist, equipment utilized shall be of low voltage type.

5.12.6 The atmosphere within the confined space shall be tested to determine it is safe to enter. Acceptable limits are:

- oxygen: 19.5% lower, 22% higher;
- flammable gas: not to exceed 10% of lower explosion limit;
- toxic contaminants: not to exceed the permissible exposure limit.

- (c) erect warning notices around the area affected that blasting operations are in progress,
- (d) carry out a thorough search of buildings and the area affected prior to blasting,
- (e) ensure that blasting is only carried out by experienced shot firers. Priming, charging, stemming and shot firing shall be carried out with greatest regard for safety and in strict accordance with the rules and regulations of the relevant authorities (see Sub-Clause 2.5).
- (f) ensure that explosive charges are not excessive, charged boreholes are properly protected and proper precautions are taken for the safety of persons and property,

5.14.7 The Contractor shall maintain an up-to-date inventory of all explosives and explosive devices and shall submit a monthly report to the Engineer, detailing the use of all explosives by date and location.

5.15 Excavation and Trenching

5.15.1 An excavation permit signed by the Engineer must be issued before excavation proceeds in any work location. The Contractor shall investigate and identify the location of existing services by study of the drawings, a visual/physical study of the site, sweeping by appropriate detection equipment and where necessary hand excavation of trial holes.

Following this investigation, the Contractor shall submit a written request for an excavation permit to the Engineer.

The Engineer will return the permit signed and dated to indicate:

- services which are to be maintained.
- services which are to be isolated.
- any special precautions to be taken.

A sample Excavation Permit is given in Appendix I.

5.15.2 The issue of an Excavation Permit by the Engineer shall not relieve the Contractor of his responsibilities under the Contract.

5.15.3 The side of all excavations and trenches exceeding 1.3 meters in depth which might expose personnel or facilities to danger resulting from shifting earth shall be protected by adequate temporary supports or sloped to the appropriate angle of repose.

5.15.4 All excavations, slopes and temporary supports shall be inspected daily and after each rain, before allowing personnel to enter the excavation.

5.15.5 Excavations 1.3 metres or more in depth and occupied by personnel shall be provided with ladders as a means for entrance and egress. Ladders shall extend not less than 1 metre above the top of the excavation.

3.15.6 The Contractor shall provide adequate barrier protection to all excavations. Barriers shall be readily visible by day or night.

5.15.7 Excavated or other materials shall not be stored at least 0.65 metres from the side of excavations.

5.16 Concrete Reinforcement Starter Bars

5.16.1 The Contractor shall ensure concrete reinforcement starter bars are not a danger to personnel. Where permitted by the Engineer, starter bars shall be bent down. Alternatively, the starter bars shall be protected using either hooked starters, plastic caps, plywood covers or other methods agreed with the Engineer.

6 Environmental and Health Requirements

6.1 Protection of the Environment

6.1.1 The Contractor shall be knowledgeable of and comply with all environmental laws, rules and regulations for materials, including hazardous substances or wastes under his control. The Contractor shall not dump, release or otherwise discharge or dispose of any such material without the authorisation of the Engineer.

6.1.2 Any release of a hazardous substance to the environment, whether air, water or ground, must be reported to the Engineer immediately. When releases resulting from Contractor action occur, the Contractor shall take proper precautionary measures to counter any known environmental or health hazards associated with such release. These would include remedial procedures such as spill control and containment and notification of the proper authorities.

6.2 Air Pollution

6.2.1 The Contractor, depending on the type and quantity of materials being used, may be required to have an emergency episode plan for any releases to the atmosphere. The Contractor shall also be aware of local ordinances affecting air pollution.

6.2.2 The Contractor shall take all necessary measures to limit pollution from dust and any wind blown materials during the Works, including damping down with water on a regular basis during dry climatic conditions.

6.2.3 The Contractor shall ensure that all trucks leaving the Site are properly covered to prevent discharge of dust, rocks, sand, etc.

6.3 Water Pollution

6.3.1 The Contractor shall not dispose of waste solvents, petroleum products, toxic chemicals or solutions in the city drainage system or watercourse, and shall not dump or bury garbage on the Site. These types of waste shall be taken to an approved disposal facility regularly, and in accordance with requirements of relevant Authorities. The Contractor shall also be responsible to control all run-offs, erosion, etc.

6.4 Solid Waste

6.4.1 General Housekeeping

- (a) The Contractor shall maintain the site and any ancillary areas used and occupied for performance of the Works in a clean, tidy and rubbish-free condition at all times.
- (b) Upon the issue of any Taking-Over Certificate, the Contractor shall clear away and remove from the Works and the Site to which the Taking-Over Certificate relates, all Contractor's Equipment, surplus material, rubbish and Temporary Works of every kind, and leave the said Works and Site in a clean condition to the satisfaction of the Engineer. Provided that the Contractor shall be entitled to retain on Site, until the end of the Defects Liability Period, such materials, Contractor's Equipment and Temporary Works as are required by him for the purpose of fulfilling his obligations during the Defects Liability Period.

6.4.2 Rubbish Removal and Disposal

- (a) The Contractor shall comply with statutory and municipal regulations and requirements for the disposal of rubbish and waste.
- (b) The Contractor shall provide suitable metal containers for the temporary storage of waste.
- (c) The Contractor shall remove rubbish containers from site as soon as they are full. Rubbish containers shall not be allowed to overflow.
- (d) The Contractor shall provide hardstandings for and clear vehicle access to rubbish containers.

- (e) The Contractor shall provide enclosed chutes of wood or metal where materials are dropped more than 7 metres. The area onto which the material is dropped shall be provided with suitable enclosed protection barriers and warning signs of the hazard of falling materials. Waste materials shall not be removed from the lower area until handling of materials above has ceased.
- (f) Domestic and biodegradable waste from offices, canteens and welfare facilities shall be removed daily from the site.
- (g) Toxic and hazardous waste shall be collected separately and be disposed of in accordance with current regulations.
- (h) No waste shall be burnt on Site unless approved by the Engineer.

6.4.3 Asbestos Handling and Removal

The Contractor shall comply with all local regulations regarding the handling of asbestos materials. In the absence of local regulations, relevant International Standards shall apply.

6.4.5 Pest Control

The Contractor shall be responsible for rodent and pest control on the Site. If requested, the Contractor shall submit to the Engineer, for approval, a detailed programme of the measures to be taken for the control and eradication of rodents and pests.

6.5 Noise Control

- 6.5.1 The Contractor shall ensure that the work is conducted in a manner so as to comply with all restrictions of the Authorities having jurisdiction, as they relate to noise.
- 6.5.2 The Contractor shall, in all cases, adopt the best practicable means of minimizing noise. For any particular job, the quietest available plant/and or machinery shall be used. All equipment shall be maintained in good mechanical order and fitted with the appropriate silencers, mufflers or acoustic covers where applicable. Stationary noise sources shall be sited as far away as possible from noise-sensitive areas, and where necessary acoustic barriers shall be used to shield them. Such barriers may be proprietary types, or may consist of site materials such as bricks or earth mounds as appropriate.
- 6.5.3 Compressors, percussion tools and vehicles shall be fitted with effective silencers of a type recommended by the manufacturers of the equipment. Pneumatic drills and other noisy appliances shall not be used during days of rest or after normal working hours without the consent of the Engineer.
- 6.5.4 Areas where noise levels exceed 90 decibels, even on a temporary basis, shall be posted as high noise level areas.

7 Additional Requirements for Work in Public Areas

7.1 General

- 7.1.1 These additional requirements shall apply to all works carried out in Public Areas.
- 7.1.2 Public Areas are defined as areas still used by or accessible to the public. These include public roads and pavements, occupied buildings and areas outside the Contractor's boundary fencing.
- 7.1.3 All work in Public Areas shall be carried out to minimise disturbance and avoid dangers to the public.
- 7.1.4 Before commencing work, the Contractor shall ensure that all necessary resources, including labour, plant and materials, will be available when required and that the works will proceed without delays and be completed in the shortest possible time. Periods of inactivity and slow progress or delays in meeting the agreed programme for the works, resulting from the Contractor's failure to provide necessary resources or other causes within the control of the Contractor, will not be accepted. In the event of such inactivity, slow progress or delays, the Contractor shall take immediate action to rectify the situation, including all possible acceleration measures to complete the works within the agreed programme. Details of the actions and acceleration measures shall be submitted to the Engineer. If the Engineer is dissatisfied with the Contractor's proposals, the Contractor shall take such further actions or measures as required by the Engineer. All costs incurred shall be the responsibility of the Contractor.

7.2 Method Statement

- 7.2.1 The Contractor shall submit to the Engineer a method statement for each separate area of work in Public Areas. The Method Statement shall include:
- (a) a general description of the Works and methodology of how it will be carried out.
 - (b) details of the measures and temporary works to minimise disturbance and safeguard the public. These shall include temporary diversions, safety barriers, screens, signs, lighting, watchmen and arrangements for control of traffic and pedestrians and advance warning to be given to the public.
 - (c) details of temporary reinstatement and maintenance of same prior to final reinstatement.
 - (d) for works involving long lengths of trenches or works to be completed in sections, the lengths or sections of each activity (eg up to temporary reinstatement, temporary reinstatement, final reinstatement) to be carried out at any one time.
 - (e) details of the availability of necessary resources (labour, plant, materials, etc) to complete the work.
 - (f) a programme showing start and completion dates and periods for all activities of each length or section, including temporary works, and the works overall.
 - (g) such further information as necessary or required by the Engineer.

7.2.2 The Contractor shall not commence work, including temporary works, until approval of the Contractor's Method Statement by the Engineer.

7.2.3 Method Statements shall be updated based on actual progress or as and when required by the Engineer.

7.3 Closure of Roads, Etc

7.3.1 The closure or partial closure of roads, pavements and other public areas will only be permitted if approved by the Engineer and Relevant Authorities. The Contractor shall detail for each closure the extent of area to be closed, the reasons and duration of the closure and, where appropriate, proposed diversions.

A sample Street Closure Permit is given in Annex 2.

7.4 Trench and Other Excavations

7.4.1 The requirements covering trench and other excavations will depend on the location and type of the excavation and the potential risks to the public.

7.4.2 The following guidelines apply particularly to trenches but shall also apply to other types of excavations:

(a) before commencing work the Contractor shall:

- notify the Engineer on the location and duration of the work. An excavation permit signed by the Engineer must be issued in accordance with Sub-Clause 5.15.1 before excavation proceeds in any work location.;
- obtain permission from relevant authorities including the police when required. The Contractor's attention is drawn to the requirements of Legislative Decree No 68 dated 9 September 1983, issued by the President of the Republic of Lebanon, and in particular to the provisions therein regarding prior notification by the Contractor to and the issue of excavation licenses by the Director of Roads or the Head of the Municipal Authority concerned, as applicable, before the commencement of excavations within the limits of streets, roads and other areas defined under the said Decree.
- erect all temporary works such as barriers, warning signs, lighting, etc;
- have available adequate materials for temporary supports to sides of excavations and necessary labour, plant and materials to complete the work within the shortest possible time;

(b) in carrying out the works the Contractor shall, unless otherwise permitted or required by the Engineer:

- not open more than one excavation within a radius of 250 metres;
- limit the length of trench excavation open at one time to 150 metres;
- maintain and alter or adapt all temporary works including supports to sides of excavations;
- remove all surplus excavated material the same day it is excavated;
- complete the works, including final reinstatement within ten days;
- where final reinstatement is not achieved within the required time, to carry out temporary reinstatement;
- ensure that any temporary reinstatement is maintained at the correct level until final reinstatement is achieved.

7.4.3 The above guidelines shall not relieve the Contractor of his obligations and responsibilities.

7.5 Safety Barriers

7.5.1 Safety barriers shall be provided to the perimeter of work areas and to trench and other types of excavations and to existing openings such as manholes, drawpits and the like. When exposed to the public, safety barriers shall be provided to both sides of trenches and around all sides of openings.

7.5.2 The Contractor shall provide details of the type or types of safety barriers for each excavation for the approval of the Engineer prior to commencing work. No work shall commence until the safety barriers are in place.

7.5.3 The type of safety barrier used shall be appropriate to the particular location and the potential risks to the public. Examples of different types of safety barriers are given below:

- Type 1 - excavated material;
- Type 2 - non-rigid barrier of rope or florescent tape strung between metal rods driven into the ground;
- Type 3 - rigid barrier of timber, steel or concrete. Such barriers could be in the form of horizontal rail(s) or sheet material secured to posts driven or concreted into the ground.

7.5.4 The following are guidelines on the type of safety barriers that could be used in differing situations. They apply particularly to trenches but also apply to other types of excavations, existing openings and to the perimeter of work areas:

- areas not subject to vehicular traffic - Types 1 or 2;

- roadways (low traffic speed) - Types 1 or 2;
- roadways (high traffic speed) - Types 1 or 3.

7.5.5 The above examples of the types of barriers and the guidelines on situations in which they could be used shall not relieve the Contractor of his obligations and responsibilities.

8 Contractor's Site Check List

- 8.1 A sample Contractor's Site Check List is included in Annex 3. This is included to assist contractors should they wish to introduce such a system as part of their site management procedures. The list is not exhaustive and further items will need to be added by the Contractor.
- 8.2 The list is issued for guidance only, and does not, in any way, revise or limit the requirements covered elsewhere in these Regulations.

Annex 1

Sample Excavation Permit

To: (Engineer)

From: (Contractor)

Date:

CDR Contract No:

Request for Excavation Permit No:

Please give approval for excavation to proceed in the following area:

Work to start on:

Existing services have been checked and identified by:

Drawings # Physical Survey #

Catscan # Trial Holes Excavation #

Signed (Contractor):

Approval of Engineer

The above excavation may proceed, subject to the following:

Services to be maintained:

Services to be isolated before work proceeds:

Other matters:

Signed (Engineer):

Date:

Annex 2

Sample Street Closure Permit

To: (Engineer)

From: (Contractor)

Date:

CDR Contract No:

Request for Street Closure Permit No:

Please give approval for the closure of the following street(s) from to (dates)

Street(s):

Reasons:

Proposed diversions:

Signed (Contractor):

Approval of the Engineer

The above street(s) may be closed for the periods stated subject to the following conditions:

Approval has been given by relevant authorities and the police;

Other:

Signed (Engineer):

Date:

Annex 3**Sample Contractor's Site Check List****Safe Access:**

- arrangements for visitors and new workers to the site
- safe access to working locations
- walkways free from obstructions
- edge protection to walkways over 2m above ground
- holes fenced or protected with fixed covers
- tidy site and safe storage of materials
- waste collection and disposal
- chutes for waste disposal, where applicable
- removal or hammering down of nails in timber
- safe lighting for dark or poor light conditions
- props or shores in place to secure structures, where applicable

Ladders:

- to be used only if appropriate
- good condition and properly positioned
- located on firm, level ground
- secure near top. If not possible, to be secured near the bottom, weighted or footed to prevent slipping
- top of ladder minimum 1 metre above landing place

Scaffolding:

- design calculations submitted
- proper access to scaffold platform
- properly founded uprights with base plates
- secured to the building with strong ties to prevent collapse
- braced for stability
- loadbearing fittings, where required
- uprights, ledgers, braces and struts not to be removed during use
- fully boarded working platforms, free from defects and arranged to avoid tipping or tripping
- securely fixed boards against strong winds
- adequate guard rails and toe boards where scaffold 2m above ground
- designed for loading with materials, where appropriate
- evenly distributed materials
- barriers or warning notices for incomplete scaffold (ie not fully boarded)
- weekly inspections and after bad weather by competent person
- record of inspections

Excavation:

CDR Safety, Health & Environmental Regs, June 96
E:\...bidding\sheregs.doc

- underground services to be located and marked and precautions taken to avoid them
- adequate and suitable timber, trench sheets, props and other supporting materials available on site before excavation starts
- safe method for erecting/removal of timber supports
- sloped or battered sides to prevent collapse
- daily inspections after use of explosives or after unexpected falls of materials
- safe access to excavations (eg sufficiently long ladder)
- barriers to restrict personnel/plant
- stability of neighbouring buildings/risk of flooding
- materials stacked, spoil and vehicles away from top of excavations to avoid collapse
- secured stop blocks for vehicles tipping into excavations

Roof work:

- crawling ladders or boards on roofs more than 10 degrees
- if applicable, roof battens to provide a safe handhold and foothold
- barriers or other edge protection
- crawling boards for working on fragile roof materials such as asbestos cement sheets or glass. Guard rails and notices to same
- rooflights properly covered or provided with barriers
- during sheeting operations, precautions to stop people falling from edge of sheet
- precautions to stop debris falling onto others working under the roof work

Transport and mobile plant:

- in good repair (eg steering, handbrake, footbrake)
- trained drivers and operators and safe use of plant
- secured loads on vehicles
- passengers prohibited from riding in dangerous positions
- propping raised bodies of tipping lorries prior to inspections
- control of on-site movements to avoid danger to pedestrians, etc
- control of reversing vehicles by properly trained banksmen, following safe system of work

Machinery and equipment:

- adequate and secured guards in good repair to dangerous parts, eg exposed gears, chain drives, projecting engine shafts

- correct pins used in the props
- timberwork in good condition
- inspection by competent person, against agreed design before pouring concrete

Risks to the Public:

- identify all risks to members of the public on and off site, eg materials falling from scaffold etc., site plant and transport (access/egress) and implement precautions, eg scaffold fans/nets, banksmen, warning notices etc
- barriers to protect/isolate persons and vehicles
- adequate site perimeter fencing to keep out the public and particularly children. Secure the site during non-working periods
- make safe specific dangers on site during non-working periods, eg excavations and openings covered or fenced, materials safely stacked, plant immobilised, ladders removed or boarded

Fire - general:

- sufficient number and types of fire extinguishers
- adequate escape routes, kept clear
- worker awareness of what to do in an emergency

Fire - flammable liquids:

- proper storage area
- amount of flammable liquid on site kept to a minimum for the day's work
- smoking prohibited; other ignition sources kept away from flammable liquids
- proper safety containers

Fire - compressed gases, eg oxygen, LPG, acetylene:

- properly stored cylinders
- valves fully closed on cylinders when not in use
- adopt "hot work" procedures
- site cylinders in use outside huts

Fire - other combustible materials:

- minimum amount kept on site
- proper waste bins
- regular removal of waste material

Noise:

- assessment of noise risks
- noisy plant and machinery fitted with silencers/muffs
- ear protection for workers if they work in very noisy surroundings

Health:

- identify hazardous substances, eg asbestos, lead, solvents etc and assess the risks
- use of safer substances where possible
- control exposure by means other than by using protective equipment
- safety information sheets available from the supplier
- safety equipment and instructions for use
- keep other workers who are not protected out of danger areas
- testing of atmosphere in confined spaces; provision of fresh air supply if necessary. Emergency procedures for rescue from confined spaces

Manual handling:

- avoid where risk of injury
- if unavoidable, assess and reduce risks

Protective clothing:

- suitable equipment to protect the head, eyes, hands and feet where appropriate
- enforce wearing of protective equipment

Welfare:

- suitable toilets
- clean wash basin, hot/warm water, soap and towel
- room or area where clothes can be dried
- wet weather gear for those working in wet conditions
- heated site hut where workers can take shelter and have meals with the facility for boiling water
- suitable first aid facilities

Work in Public Areas

- all risks to the public identified
- method statement approved
- road closures approved
- temporary diversions in place
- safety barriers erected/maintained
- safety signs and lighting installed/maintained
- labour, materials, plant and other resources sufficient to meet programme
- temporary reinstatement completed and properly maintained

- permanent reinstatement completed at earliest possible date

Part II

Supplementary Safety, Health and Environmental Regulations

Clause No.

Sub-Clause 3.2.2 of Part I specifies deductions in USD. If the currency of payments for a contract is NOT USD, one of the following two alternative Sub-Clause should be included in Part II.

Alternative 1 should be included when the currency of payments is specified in the Contract (eg Lebanese Pounds). The amounts included in Alternative 1, for D1, D2 and D3, should be stated in the appropriate currency of payment based on the equivalent in that currency of the USD amounts in Part I.

Alternative 2 should be included when the currency of payments is not known at time of preparing the bidding documents (eg in the CDR Standard Bidding Documents for Smaller Contracts, the payment currency or currencies are specified by the Bidder as part of his Bid).

If the currency of payment is USD, neither of the alternatives need to be included in Part II.

Alternative 1

3.2.2 Delete text, and replace with the following:

The basic deduction from payment for each classification in Sub-Clause 3.2.1, is as follows:

for D1 - _____ [*insert currency and amount*];
 for D2 - _____ [*insert currency and amount*];
 for D3 - _____ [*insert currency and amount*].

Alternative 2

3.2.2 Add second paragraph as follows:

The deductions in paragraph 1 of this Sub-Clause, shall be in the currency or currencies to be paid to the Contractor. The amount in each currency shall be based on the USD amounts in PART I and the exchange rates for the payment currency or currencies stated in the Contract.

Annex D. Public Participation

D1. List of attendees



لائحة حضور جلسة مشاركة العامة لمشروع الطرق والعمالة في لبنان

الزمان: 2019/12/12

المكان: حلبة التدريب

البريد الإلكتروني	الهاتف	العمر	الجنس	المهنة/المهنة	البلدة	الإسم الثلاثي
Masabusa@Hokmak.com	03/203441	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input checked="" type="checkbox"/> 40-50 <input type="checkbox"/> أكثر من 50	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	مديرية بلدية الكرك	دورا	محمد فوزي
03/998288		<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	مديرية لفة الزبي مديرية الجارية مديرية الجارية الريف	كفر الزبي	زيد الكرم
Mawelline@hok.com	03 207434	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	رئيس اتحاد البيوتات و بلدية البرزة	البيوتات	مصطفى الخرا
03/634474		<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	<input type="checkbox"/> ذكر <input checked="" type="checkbox"/> أنثى	رئيس بلدية	عجريت	دنيا الخرا

الاسم الثلاثي	البلدة	المصنف/ المهنة	الجنس	العمر	الهاتف	البريد الإلكتروني
5. سفيان بن محمد	موتن	رئيس شركة	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	٠٢١٢٤٤٤٤٤	
6. جموع دينا كرم	أصبا	رئيس شركة	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	٧٠/٢١٥١٢٤٤	
7. ربهه عوفان اجرف	كور	رئيس شركة	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	٢/٢٥٦٥٠٠	nogm.y.kh@yopmail.com @yopmail.com
8. محمد بن محمد الطوي	الحدرا	رئيس شركة	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	٧١/٢٠١٠٢٠	hammad.b.khouri@gmail.com
9. طارق الشحاني	بسميا	رئيس شركة	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	70-256756	Charles Dinkany @hotmail.com



البريد الإلكتروني	الهاتف	العمر	الجنس	المنصب/ المهنة	البلدة	الاسم الثلاثي
matkiam59@hotmail.com	03-625224	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	<input type="checkbox"/> ذكر <input checked="" type="checkbox"/> أنثى	موظف في مجلس بلدية البرزنج معلمة	البرزنج	10. نادر صقوب جبارك
KhalifaFadia@gmail.com	03-632369	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	<input type="checkbox"/> ذكر <input checked="" type="checkbox"/> أنثى	موظف في مجلس بلدية البرزنج ضابطة جمارك طعام	البرزنج	11. طارق جواد خديجة
TOHNY1095@gmail.com	70-639099	<input type="checkbox"/> أقل من 20 <input checked="" type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input type="checkbox"/> أكثر من 50	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	مهندس مدني	كفر حلاوة	12. جوني آدين عيسى
dr. odib.mawana@gmail.com	03/611 626	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	مستشارة	كفر حلاوة	13. حاديت سعيد
maroun.dabbas@sybaa.com	08/203545	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	مستشار المباني	كفر حلاوة	14. طارق سليم

البريد الإلكتروني	الهاتف	العمر	الجنس	المهنة/المهنة	البلدة	الأسم الثلاثي
	٧٢٢٢٥٥٤٤	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	رئيسة المظلة	عمريت	نادية بلال موسى
	٠٢, ٦١٤١٤٥	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	رئيسة الإنتاج	ديرية	جودع بيبيك ولد
	03/549631	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input checked="" type="checkbox"/> 40-50 <input type="checkbox"/> أكثر من 50	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	CDR مهاجر الإغز مدرسة		هلا أوريبي
	03/838995	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input type="checkbox"/> أكثر من 50	<input type="checkbox"/> ذكر <input checked="" type="checkbox"/> أنثى	رئيسة عتمة الرئاسة الأولى المهنة - المهنة		ليلى مرسية
contact@chrt.org.bh	79159133	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	شيش بلدي	زاني	شادي زينو

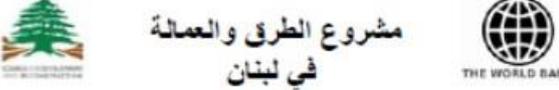


MINISTRY OF PLANNING
AND ECONOMIC DEVELOPMENT
KINGDOM OF BAHRAIN

البريد الإلكتروني	الهاتف	العمر	الجنس	المصنف/ المهنة	البلدة	الأسم الثلاثي
mubarak_staphani@bahrain.com	03/789267	<input type="checkbox"/> أقل من 20 <input checked="" type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input type="checkbox"/> أكثر من 50	<input type="checkbox"/> ذكر <input checked="" type="checkbox"/> أنثى	مهندسة مدنية و بيئية في بلدية البحرين	البحرين	ستيفاني اسطفا مباركي
kompass10@gmail.com	03/744192	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	<input type="checkbox"/> ذكر <input checked="" type="checkbox"/> أنثى	مهندسة البلدية	البحرين	ريزة اسطفا عازف البحرين
Tammaraaoun@bahrain.com	70300886	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	<input type="checkbox"/> ذكر <input type="checkbox"/> أنثى	مهندسة بلدية	البحرين	فهد البحرين
	70363973	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	<input type="checkbox"/> ذكر <input type="checkbox"/> أنثى	مهندسة البلدية	البحرين	سجاد عيسى البحرين
	03-3188	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input type="checkbox"/> أكثر من 50	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	مهندسة البلدية	البحرين	محمد عطار

الاسم الثلاثي	البلدة	المنصب/ المهنة	الجنس	العمر	الهاتف	البريد الإلكتروني
25. عبد العزيز بن علي	كفر عوي	رئيس البلدية	ذكر <input checked="" type="checkbox"/> انثى	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	03/658513	Posgadkl@hotmail.com
26. فاديا عيسى نعل	زلة	اصباح	ذكر <input checked="" type="checkbox"/> انثى	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	03/964821	Shaw.Ramoud@ktrivd.com
27. م. براهيمه باهي		رئيس البلدية الهندسي في اتحاد بلديات البحرين	ذكر <input checked="" type="checkbox"/> انثى	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input checked="" type="checkbox"/> 40-50 <input type="checkbox"/> أكثر من 50	03/273467	rawwaidahyafkin@ktrivd.com
28. م. محمد شريك	Team Bnti	مدير مشروع	ذكر <input checked="" type="checkbox"/> انثى	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	8/061469	mshahab56@gmail.com
29. وليد امين الريهاني	كويتا	نايب رئيس البلدية	ذكر <input checked="" type="checkbox"/> انثى	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input checked="" type="checkbox"/> أكثر من 50	03/230133	walid.amin@smc.com

البريد الإلكتروني	الهاتف	العمر	الجنس	المهنة/المهنة	البلد	الإسم الثلاثي
SMOAW@03-22498	71224152	<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input checked="" type="checkbox"/> 40-50 <input type="checkbox"/> أكثر من 50	<input checked="" type="checkbox"/> ذكر <input type="checkbox"/> أنثى	مهندس	CDR	محمد صوري
CDR.GOV.IL		<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input checked="" type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input type="checkbox"/> أكثر من 50	<input type="checkbox"/> ذكر <input checked="" type="checkbox"/> أنثى		الشرق مستشار في البحرين	إمانى طارق
awameh, behnam @shab.com		<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input type="checkbox"/> أكثر من 50	<input type="checkbox"/> ذكر <input type="checkbox"/> أنثى			
		<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input type="checkbox"/> أكثر من 50	<input type="checkbox"/> ذكر <input type="checkbox"/> أنثى			
		<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input type="checkbox"/> أكثر من 50	<input type="checkbox"/> ذكر <input type="checkbox"/> أنثى			
		<input type="checkbox"/> أقل من 20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> 40-50 <input type="checkbox"/> أكثر من 50	<input type="checkbox"/> ذكر <input type="checkbox"/> أنثى			



**مشروع الطرق والعمالة
في لبنان**

خطة الإدارة البيئية والاجتماعية

قضاء البترون - Lot 5

إجتماع تشاوري
عنى بلدية البترون
في 20 كانون الأول 2019



نقاط حوار الجلسة

- المقدمة
- وصف المشروع
- الجهات المعنية
- أهداف اللقاء
- تأهيل الطرقات في قضاء البترون
- الوضع الحالي
- الأثر البيئية والاجتماعية الإيجابية والسلبية
- الإجراءات التخفيفية الرصد والمراقبة وتقوية القدرات
- أسئلة ومناقشة

مقدمة

- تتمتع شبكة الطرق في لبنان بنطاق وتغطية كافيين بشكل عام
- نسبة كبيرة من تلك الطرق في حالة سيئة
- خاصة في المناطق الريفية التي تحتر فيها حالة شبكة الطرق أدنى مستوى من حالة الطرقات على المستوى الوطني ككل
- ما يؤدي إلى إعاقة التنمية المحلية والاقتصادية

مشروع الطرق والعمالة في لبنان

وصف المشروع

المكون الأول:	المكون الثاني:	المكون الثالث:
إعادة تأهيل الطرق وصيانتها	تصميم الاسجعية لطران الطرق	بناء القدرات ودعم التنفيذ
<ul style="list-style-type: none"> إعادة تأهيل وصيانة الطرق الأساسية لتحسين ترابط خطوط النقل وخلق فرص عمل إعادة بناء الطبقات الأساسية طبقات إضافية من الأسفلت أعمال تصريف المياه أعمال تثبيت الانحدارات جدران الدعم تصحيحات على جوانب الطرق التي تعبر عبر الميادين (الأرصفة وزراعة الأشجار) 	<ul style="list-style-type: none"> تحسين القدرات على التعامل مع الطوارئ المتعلقة بالطرق - ولا سيما خلال عواصف الثلوج بناء شبكات المصحات (بحر القات) وتأخذت طوح ورشحات ملح ومركبات دفع راعي) 	<ul style="list-style-type: none"> بناء قدرات الهيئات اللبنانية في تخطيط وإدارة قطاع الطرق المساهمة في تدريب وبناء قدرات الممولين والممارسين على المشاريع حول تقنيات حديثة ممكنة لبناء الطرق وصيانتها

الجهات المعنية

الجهة	الصفة
البنك الدولي	ممول المشروع
مجلس الامماء والاعمار	إدارة وتنفيذ
TEAM International	استشاري هندسي
المكاتب المعنية	وزارة الأشغال العامة - المديرية العامة للطرق والمواصلات

أهداف اللقاء

- إعلام الرأي العام بالمشروع لإبداء ملاحظاتهم وفقاً لسياسة ضمانات البنك الدولي (سياسة تنميلية رقم 4.01)
- عرض لأهم الآثار لتنفيذ المشروع ومناقشة خطة الإدارة البيئية والاجتماعية للمشروع



تأهيل الطرقات في قضاء البترون

الموضع الحالي

الطرق
القوية

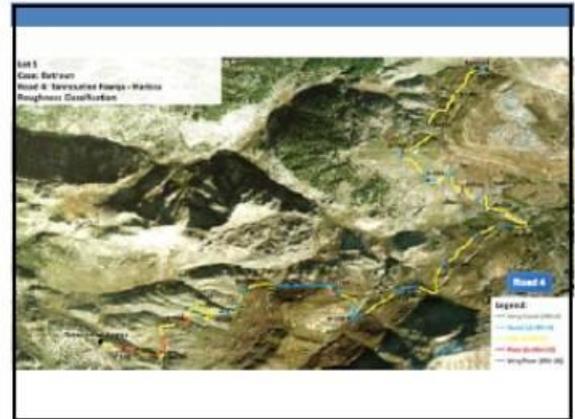
المرصد
والمرآة

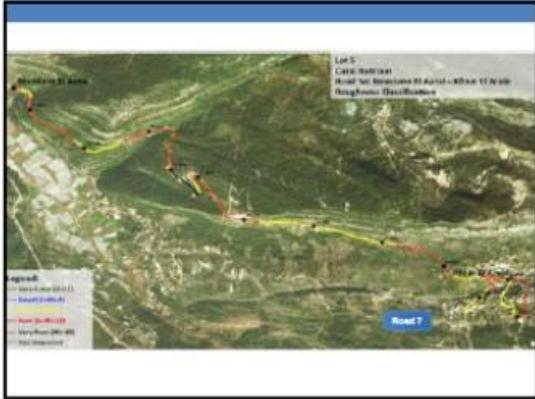
الاجراءات
التكيفية

الاتجاه

4. الوضع الحالي: الطرق المقترحة في قضاء البترون

الترتيب	الطول (KM)	عدد الكيلومترات
Road 1	11	طرابلس - طرابلس
Road 2	5.3	بستان العيون - طرابلس - بيت التلا - طرابلس النما
Road 3	11	طرابلس - طرابلس
Road 4	6	بستان العيون - طرابلس





5. الآثار البيئية والاجتماعية الإيجابية للمشروع

- تحسين حافة الطرق
- الحد من الحوادث المرورية
- خلق فرص العمل للمقيمين المحليين
- مشاركة أوسع ومنفعة للمرأة والشباب
- تأثير إيجابي للوضع البيئي والاجتماعي المحلي

6. الآثار البيئية والاجتماعية السلبية المحتملة للمشروع بشكل مؤقت

- تلوث الضوضائي
- تلوث الهواء
- زراعة قطع الخشب الطبيعي
- التربة والغطاء المعدنية
- المشكلات الصحية
- عدم نظافة حيز الترسبات أو كبري مغلقة
- التأثير على البنية التحتية للقطعة

6. الآثار البيئية والاجتماعية المحتملة للمشروع

الآثار	مرحلة الإنشاء	مرحلة التشغيل
حركة السير	-/-	++/+
نوعية الهواء	-	-/+
ضوضاء	-/-	-/+
مخلفات الإنشاء و الأتربة	--	0
المياه	-/-	+0
زراع الغطاء النباتي الطبيعي	-	0
الصحة والسلامة العامة	-	-/+
الآثار الاقتصادية و الاجتماعية	+/-	++/+

7. الإجراءات التخفيفية المقترحة (1)

الآثار	الإجراءات التخفيفية
حركة السير	<ul style="list-style-type: none"> إعداد خطة الحركة المرورية على الطرق قبل أعمال البناء لتحديد جميع عمليات تحويل الطرق المعقدة للحد من حركة المرور والازدحام إعلام العامة عن برنامج إعادة تأهيل طريق وخطه للحركة المرورية إيجاد طرق بديلة و جسر مؤقتة لعبور أصحاب المحلات و السكان المتضررين تنظيم حركة المرور
نوعية الهواء	<ul style="list-style-type: none"> استخدام محلات ذات كفاءات منخفضة في أعمال البناء وإحضارها إلى برنامج صيانة رهن المياه للحد من انبعاثات الغبار تغطية مركبات نقل المواد الأتربة والمسحبات من وإلى مواقع البناء توجيه مسارات الانبعاث بعيداً عن المساكن المحيطة
ضوضاء	<ul style="list-style-type: none"> استخدام محلات ذات كفاءات منخفضة في أعمال البناء وإحضارها إلى برنامج صيانة استعمال كواتم صوت حصر الأعمال العنيفة للضوضاء بمساعات العمل النهارية وضع إجراءات لتخفيف المروحة الضوئية زراع الأشجار في المناطق الحساسة

7. الإجراءات التخفيفية المقترحة (2)

الآثار	الإجراءات التخفيفية
مخلفات الإنشاء والأعمال	<ul style="list-style-type: none"> التخلص من النفايات ومخلفات البناء في أماكن مناسبة المرافقة الفورية لأعمال الإنشاء المرافقة الفورية لصيانة المعدات
المياه	<ul style="list-style-type: none"> تشفيف على مسارات المياه قبل البدء بإعادة التأهيل جعل الطرق مائجة لمنع تجمع المياه تنظيف و صيانة هيئة تصريف المياه الأمثل
زراع الغطاء النباتي الطبيعي	<ul style="list-style-type: none"> حجب الأراضي التي تقع ضمن مناطق محددة لتعميرات وطنية إعداد زراعة أنواع الحشائش المحلية إذا ما تم اقتلاعها توعية العمال حول حماية النباتات والحيوانات

7. الإجراءات التخفيفية المقترحة (3)

الآثار	الإجراءات التخفيفية
الصحة العامة	<ul style="list-style-type: none"> التأكد من التزام العاملين لمعدات التوجيه للسلامة والصحة المهنية وضع تعليمات لضمان السلامة تأمين ملابس ومعدات لضمان سلامة العمال وضع حواجز و إشارات في منطقة العمل إيجاد مسارات آمنة للميكانيكات في منطقة العمل
الآثار الاقتصادية والاجتماعية	<ul style="list-style-type: none"> الإمزاغ في تعيد إعادة التأهيل إعلام العامة عن برنامج إعادة تأهيل طريق والشوارع معهم في تحديد البرنامج المشع إيجاد طرق بديلة و جسر مؤقتة لعبور أصحاب المحلات و السكان المتضررين تنظيم حركة المرور

7. الإجراءات التخفيفية المقترحة المسؤليات

- خلال الإنشاء
 - مسؤولية تطبيق و مراقبة تطبيق الإجراءات التخفيفية
 - المسؤول
 - الإستشاري
 - مسؤول عن الإشراف على الصحة والسلامة والبيئة من بين مهام أخرى منطقة إبيه
 - مجلس الإنماء والإعمار
 - البلديات المحلية
- خلال التشغيل
 - مسؤولية تطبيق و مراقبة تطبيق الإجراءات التخفيفية
 - البلديات المحلية
 - كوزرات المعينة (الصحة عامة وعل. داخلية وبنفقات. بيئة. طاقة ومياه. إلخ)

7. خطة الرصد والمراقبة

- المراقبة المرورية من خلال الملاحظة المرورية والتوثيق الفوتوغرافي
- يتم قياس بعض المؤشرات (عدد مرور السيترات، نوعية المياه، نوعية الهواء، مستوى الضوضاء، إلخ) عندما تتلر الشكاوي من قبل العامة
- مسؤولية المراقبة تقع على عاتق المهندس في الموقع من قبل الإستشاري، والمسؤول عن الإشراف على الصحة والسلامة والبيئة

ANNEX E - Complaints Register form

Name, phone and address of Complainant	Date of the complaint	Complaint issue and action taken	Corrective Action	Name of employer/ representative notified of complaint	Type of Complaint	Date of close out