Republic of Lebanon - Council for Development and Reconstruction

Road and Employment Project (REP)

Environmental and Social Management Plan (ESMP)
Final Report

LOT 1: Caza of Jbeil

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Abbreviations and Acronyms

BNR	Benteal Nature Reserve
CDR	Council for Development and Reconstruction
CoC	Code of Conduct
CoM	Council of Ministers
DLIPS	Department of Labour Inspection, Prevention and Safety
EHS	Environment Health and Safety
ESMP	Environmental and Social Management Plan
EIA	Environmental Impact Assessment
EMoP	Environmental Monitoring Plan
ESMF	Environmental and Social Management Framework
EU	European Union
GBV	Gender Based Violence
GDP	Gross Domestic Product
GOL	Government of Lebanon
GRM	Grievance Redress Mechanism
IFC	International Finance Cooperation
IUCN	International Union for Conservation of Nature and Natural Resources
ILO	International Labour Organization
LULC	Land Use Land Cover Map
MoA	Ministry of Agriculture
MOE	Ministry of Environment
MoIM	Ministry of Interior and Municipalities
MoL	Ministry of Labour
MOPH	Ministry of Public Health
MOPWT	Ministry of Public Works and Transportation
MoSA	Ministry of Social Affairs
NGOs	Non-Governmental Organizations
OP	Operational Plan
OHS	Occupational Health and Safety
PAPs	Project Affected Persons
PAs	Protected Areas
PHS	Public Health and Safety
PIU	Project Implementation Unit
PM	Particulate Matter
REP	Roads and Employment Project
SAP	Safeguards Action Plan
SEA	Sexual Exploitation and Abuse
SH	Sexual Harassment
UNESCO	United Nations Educational, Scientific and Cultural Organization
WB	World Bank
WBG	World Bank Group
WEF	World Economic Forum
WWTP	Waste Water Treatment Plant

EXECUTIVE SUMMARY

Introduction

Lebanon Roads and Employment Project (REP) funded by the World Bank (WB) aims to improve the roads conditions and traffic safety by rehabilitation of road network in Lebanon, especially in rural lagging regions and to create job opportunities for displaced Syrians and Lebanese citizens through the labor-intensive works of rehabilitation.

The project works will be executed on the main road network which is under the jurisdiction of the Ministry of Public Works and Transportation (MoPWT). In this context, the Lebanese Council for Development and Reconstruction (CDR) will implement Lebanon REP on behalf of the government/MoPWT.

Considering that the anticipated civil works will result in environmental and social impacts, an Environmental and Social Management Plan (ESMP) shall be prepared under the requirements of OP4.01, that classifies the project as Category B to limit potnetial implications. Accordingly, Dar Al Handasah Nazih Taleb & Partners developed in this report a specific ESMP for Jbeil Caza.

The objective of the ESMP is to identify and assess the potential environmental and social impacts of REP and consult relevant stakeholders to prepare a management plan that includes mitigation measures for the expected social and environmental risks, a monitoring plan, as well as to define responsibilities in the operationalization of the ESMP.

Project Description

The project covers classified roads in 25 Cazas throughout Lebanon with an expected total length of 835 km. Two of the proposed roads fall in Jbeil Caza.

This ESMP is specific for two roads that will be rehabilitated in Jbeil Caza with a total length of 28.02 km:

(1) **Jbeil Road 3 (Jbeil R3):** consists of a single alignment with a total length of 9.42 km. The road passes through Edde, Kfar-Mashoune et Dmalsa, Bintael, El-Kafr et El-Harf, Behdaidate, and El-Kfoune.
(2) **Jbeil Road 4 (Jbeil R4):** consists of two sections or alignments intersecting at El-Mouncef that have a combined length of 18.6 km.

- Section 1: El-Rihane – Hisrail – Gharzouze – Chikhane – El-Mouncef
- Section 2: Baachta - El-Rihane – El-Mouncef – El-Berbara - Bakhaase.

Road upgrading activities are limited to maintenance, minor construction, as well as to traffic management and regulation. In the case of Jbeil Caza, rehabilitation activities to be performed vary between Jbeil R3 and Jbeil R4; depending on the current state of surveyed roads. In summary, activities to be performed Jbeil Caza include pavement works (complete reconstruction when needed and milling and overlay for roads that are in better condition); lighting works (rehabilitation of lighting brackets and provision of new brackets or columns when needed), improvement and installation of drainage facilities, construction of retaining walls

and installation of safety barriers, marking and signing. Rehabilitation works will involve 55 workers and require between 12 months and 18 months.

Legal Framework

This ESMP was conducted in accordance with the World Bank safeguards and the Lebanese laws and regulations namely Law No. 444 (2002) for Environmetal Protection.

Two World Bank safeguards policies apply to Lebanon Roads and Employment Project, OP 4.01 Environmental Assessment and OP 4.12 Involuntary Resettlement. Given that the planned project will mainly focus on the rehabilitation of roads, the work in these areas will be done under OP 4.01.

In the case of Jbeil and in accordance with site specific plans, no involuntary resettlement or land acquisition will take place. In other words, there will be no displaced persons by the project activities (this includes local and Syrian refugees).

Consultation

This ESMP was publically consulted. Consulting with the main stakeholders and ensuring they agree on sensitive issues improve the chances that the project will not be subject to last-minute dispute.

A public participation meeting was arranged for Jbeil Caza. A total of 11 people attended, four of which were women. During the public participation meeting that was held at the Union of municipalities of Jbeil on Wednesday December 11, 2019, attendees were informed about the project objectives, project design, the identified natural, economic, and social resources of importance in the area, the project's possible environmental and social risks, and the planned mitigation measures for their examination and approval. Attendees were mainly worried and concerned about the monitoring process of rehabilitation works. In this context, the consultant and CDR Representative explained the monitoring process for this project and highlighted the role of municipalities and local communities in monitoring the process of work during the rehabilitation phase of the project. Further, the CDR explained that this ESMP include a Grievance Redress Mechanism (GRM) to ensure the management of any project-related complaints. This GRM was communicated to the attendees.

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 covering 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 Syrian in Lebanon by providing aid and responding to their critical situation.

Baseline assessment

The environmental and social assessment recorded the existing conditions within the project area including physical, biological and socioeconomic conditions prior the project implementation and operation. Baseline data and field survey were conducted to describe the status of the following environmental receptors: air quality, water quality, soil quality, geological conditions, climate and meteorology, natural habitats and biodiversity, land-use/land-cover, acoustic environment, cultural resources, and socio-economic conditions (employment opportunities, labor influx, social tensions, labor induced Sexual Exploitation and Abuse (SEA) Sexual Harassment (SH), occupational health and safety).

The geology of the studied roads was investigated for outcropping formations, subsurface stratigraphy, structure (faults, folds, seismic, etc.), hydrogeology (groundwater and sea water intrusions) and hydrology (surface water). Assessments showed that the outcropping lithological formations in and around the study area belongs to the Cretaceous geological time period. Both roads (Jbeil R3 and Jbeil R4) lie on permeable formations which expose the groundwater aquifers to possible contamination.

Air quality is also an essential component in assessing social wellbeing and health status of a community. The study relied on UNDP/MoE project "Air quality assessment in an East Mediterranean country: the case of Lebanon" and showed that the levels of CO, SO_2, O_3, NO_2, and PM10 are within the national limit values (Decision 52/1 dated 1996) confirming that the studied areas for the three roads do not include major air polluting activities.

Regarding natural habitats and biodiversity, given the nature of the project, the direct influence area concerns existing roads. Consequently, a rapid biological assessment has been carried out to draw the ecological profile of the adjacent areas to the concerned roads, assess flora diversity, and to identify those species endangered or IUCN-listed that are at added risk from the proposed project. The assessment showed that Jbeil R4 passes through a critical natural habitat in Moncef area (dense woodland valley) that needs special attention during the rehabilitation phase. Moreover, regarding Jbeil R3, special attention is needed when the road is close to Bentael Nature Reserve (BNR). Finally, when Jbeil R3 and Jbeil R4 are very close to rivers, particular biotopes (riparian vegetation) were recorded. Riparian habitats are important refuge for amphibians, birds and reptiles.

Lastly, a socio-economic survey was conducted in the project area to map the demographic, social and economic baseline conditions at the level of Jbeil Caza. A set of social indicators were investigated including Jbeil's demographic profile (age and gender distribution), employment and livelihood, the availability of public and private education and health institutions, the global level of education (educational attainment) and standards of public health, access to public utility and community services, land use patterns, Archeology and cultural heritage, and impacts of the Syrian crisis. The assessment allowed drawing conclusions regarding the project's potential impacts on the socioeconomic conditions of the study area. In summary, some segments of Jbeil R3, and of Jbeil R4 section 1 are highly urbanized. Mainly, Jbeil R3 is surrounded by numerous sensitive receptors such as churches and schools, located at a distance of less than 10 m from the roads. Although places of worship are few along Jbeil R4 section 2, they are close to the road to be rehabilitated. Further, nearby agricultural lands to be highly affected were recorded in some segments of Jbeil R3, Jbeil R4 section 1, and Jbeil R4 section 2.

Impacts Evaluation

The purpose of this section is to identify and quantify all potential impacts, both adverse and beneficial, of the project on the existing environment during both rehabilitation and operational phases. The assessment studied the impacts of the proposed project on air quality, water quality, soil quality, air quality, acoustic environment, visual intrusion, land-use/land- cover and socio-economic impacts.

Regarding the operation phase, the assessment entails the the "**Defects Liability Period'** during which the Contractor is responsible for maintenance activities.

Given that the project aims to upgrade existing roads, the environmental impacts are expected to include dust raised during rehabilitation work, increase in noise pollution derived from construction machinery, degradation of water quality, disruption to traffic movement, potential damages to existing utilities, and disturbance of local biodiversity. During the rehabilitation phase, impacts on air and water quality have been evaluated as direct and irreversible. The rehabilitation phase requires the use of many heavy machinery and equipment which are usually associated with impacts on air quality. Dust and odor emissions are expected to be high during this phase. Moreover, potential impacts on water quality from rehabilitation activities are aligned with accidental spillages and contaminated storm water runoff.

In addition to the expected temporary disturbance of the natural ecosystems (noise pollution and potential soil and water contamination), direct destruction of vegetation and population might occur if waste (excavated materials) was discharged directly into the roadside shrub-lands and riparian ecosystems. However, given that the concerned roads generally involve paths that are already under anthropogenic influences, the potential impacts of the project on the local biodiversity are expected to be limited to disturbance of the natural ecosystems and local fauna when roads are surrounded by woodland (Jbeil R4, El-Mouncef), potential illegal dumping and discharge of wastes into streams, rivers and valleys that can lead to direct destruction of local biodiversity and natural habitats and finally, dust accumulation on nearby vegetation and agricultural lands (Jbeil R3 and Jbeil R4).

Potential social risks related to the project include (1) labor influx (in case the contractor doesn't recruit labor from the surrounding community) and potential risk of labor induced SH towards female workers and SEA towards women in the surrounding community (due to the close proximity of residents and schools to the roads to be rehabilitated); (2) Potential risk of child labor; (3) Poor labor conditions; (4) Dissatisfaction with job allocation; (5) Risk of under-participation or underemployment of women; (6) Nuisance and traffic disturbance; and (7) Temporary obstruction of access routes to sensitive receptors.

Social positive impacts of the project are expected to create short-term employment opportunities to local residents and Syrian refugees who will do the rehabilitation activities

Once roads are rehabilitated, the project is expected to improve road safety conditions, reduce traffic accidents and traffic congestion, and ultimately enhance livelihood opportunities. On the other hand, the main expected environmental impacts on water and soil could result in from maintenance actvities during the "**Defects Liability Period'** during which the Contractor is responsible for maintenance activities, if not managed properly.

Development of the ESMP

An ESMP is essential to ensure that the identified impacts are maintained within the allowable levels, unanticipated impacts are mitigated at an early stage, and the expected project benefits are realized. Thus, to mitigate the identified impacts/risks, the prepared ESMP for Jbeil road was prepared before initiating any civil works. The aim of this ESMP is to assist in the systematic and prompt recognition of problems, encouraging effective actions to correct them and ultimately achieve the goal of good environmental and social performance. A sound understanding of environmental priorities and policies, properly managing the project, acknowledging the regulatory requirements and keeping updated operational information are fundamental to ensure the effective and satisfactory environmental performance.

A proper management plan was provided for Jbeil roads specific concerns shown in the conducted environmental and social assessment. The plan includes measures and equipment to control exhaust emissions, dust and odor emissions, and soil manipulation activities during the rehabilitation phase. Moreover, proper measures and guidelines on the control of accidental spills of construction materials were provided to prevent soil contamination.

Regarding biodiversity, recommendations are provided to guide the project contractor in reducing the negative impacts on natural habitats and biodiversity. Mitigation actions suggested in this ESMP included recommendations regarding rehabilitation work, schedules, and solid waste management in order to avoid degrading the sites or disturbing the local fauna. Contractors must be careful during the rehabilitation work so that the direct impacts (direct destruction) on particular ecosystems and associated fauna would be minimal. Waste management plan must be adopted to avoid soil and water contamination that could have irreversible impacts on biodiversity. In other words, rehabilitation debris should not be dumped into the natural habitat (e.g. valleys, rivers). Finally, Rehabilitation activities must not take place during the two migration seasons for birds in order to avoid disturbing passenger birds (if feasible, namely for Jbeil R3, BNR).

The social risks of this project can be mitigated through periodic monitoring of labor conditions, specific required clauses within contracts that will be required to protect workers and the Code of Conduct (CoC) for Gender Based Violence (GBV) issues. This ESMP guides the contractor (1) to preferably hire local workers, (2) not to hire individuals below the legal working age in accordance with the labor law of Lebanon (3) ensure proper compliance and implementation of the CoC. Similarly, close coordination with the affected municipalities is recommended in relation to road obstruction issues. In addition, a robust GRM must be clearly communicated to all project affected persons during and before project implementation.

Further, the ESMP generated key project indicators to monitor project implementation success. It is designed to guarantee effectiveness in the measurement of major project outcomes and outputs based on measurable indicators. The risk of environmental and social impacts can be monitored (e.g. monitoring of solid waste disposal and wastewater discharge, monitoring of underage labor, and monitoring of workers behaviors during the rehabilitation work.). Project monitoring will be undertaken by the implementing agency (CDR) to ensure the project is being implemented in line with the proposed objectives and is on track to achieve expected results. Project progress reports will be prepared by CDR and submitted to the Bank for review.

Finally, a multi-layer GRM was established for the concerned roads in Jbeil Caza. GRM will ensure that any complaint is identified and handled properly and within specified timeline.

Conclusion

Assessments showed that the proposed project has potential implications, both adverse and beneficial, on the existing environment. In this context, the contractor shall be committed to putting in place several measures to mitigate the negative environmental, safety, health and social impacts associated with the development cycle of the project adhering to WB social and environmental standards and policies.

ملخص تنفيذي

مقدمة

يهدف مشروع الطرق والعمالة في لبنان الممول من البنك الدولي إلى تحسين أحوال الطرق والسلامة المرورية من خلال إعادة تأهيل شبكة الطرق في لبنان، وخاصة في المناطق الريفية النائية.كما ويهدف إلى خلق فرص عمل للمواطنين اللبنانيين والنازحين السوريين من خلال مشاركة العمالة في أعمال إعادة التأهيل.

سيتم تنفيذ أعمال المشروع ضمن شبكة الطرق الرئيسية الخاضعة لسلطة وزارة الأشغال العامة والنقل. في هذا السياق، سينفّذ مجلس الإنماء والإعمار المشروع بالنيابة عن الحكومة / وزارة الأشغال العام والنقل.

تجدر الإشارة إلى أن الأعمال المتوقعة قد تؤدي إلى آثار بيئية واجتماعية سلبية مرافقة لأعمال التنفيذ، وعليه وجب إعداد خطة إدارة بيئية واجتماعية وفقًا لمتطلبات سياسة العمليات في البنك الدولي رقم (OP4.01)، والتي تصنف المشروع على أنه الفئة B وذلك من أجل الحد من التداعيات الممكن حدوثها وتخفيف الأثار السلبية وتطوير الأثار الإيجابية. وبناءً على ذلك ، طورت شركة دار الهندسة نزيه طالب وشركاه في هذا التقرير خطة إدارة بيئية واجتماعية مخصصة لتأهيل الطرقات ضمن قضاء جبيل.

إن الهدف من خطة الإدارة البيئية والاجتماعية هو تحديد وتقييم التأثيرات البيئية والاجتماعية المحتملة للمشروع والتباحث مع الأطراف المعنيين لإعداد خطة إدارة تتضمن تدابير وسبل التخفيف من المخاطر الاجتماعية والبيئية المتوقعة، كما وتطوير خطة رصد ومراقبة، بالإضافة إلى تحديد المسؤوليات في تفعيل خطة الإدارة البيئية والاجتماعية.

وصف المشروع

يشمل المشروع الطرق المصنفة في ٢٥ قضاء في جميع أنحاء لبنان بطول إجمالي يصل إلى حوالي ٨٣٥ كم تقريباً، بحيث يوجد اثنان من الطرق المقترحة في قضاء جبيل.

تم تطوير خطة الإدارة البيئية والاجتماعية مخصصة لأعمال التأهيل ضمن هاذين الطريقين في قضاء جبيل بطول إجمالي يصل إلى حوالي ٢٨,٠٢ كم تقريبا، مقسمة على الشكل التالي:

١- طريق جبيل (٣) المسمى (Jbeil R3) بحيث يمتد على طريق واحد بطول إجمالي يبلغ ٩,٤٢ كم تقريباً. إن الطريق يمر عبر اده، كفر مشون ودمالسة، بنتاعل، الكفر والحرف، بحديدات، الكفون.
٢- طريق جبيل (٤) المسمى (Jbeil R4) بحيث يتكون من طريقيين يتقاطعا عند المنصف بطول إجمالي يبلغ ١٨,٦ كم تقريباً.
- القسم الأول: الريحان - حصرايل - غرزوز - شيخان - المنصف
- الباب الثاني: بعشتة - الريحانه - المنصف - البربارة - بخاس.

تقتصر أعمال تطوير الطرق على الصيانة وبعض أعمال الإمشاء البسيطة، وكذلك على إدارة وتنظيم حركة المرور. في قضاء جبيل ، تتنوع أنشطة إعادة التأهيل بين جبيل R3 وجبيل R4 ؛ نظراً لحالة الحالية للطرق التي تم مسحها.

لذلك فإن الأنشطة التي يتعين القيام بها في قضاء جبيل تشمل أعمال الرصف الإسفلتي (على مثال رصف كامل الطريق عند الحاجة وإزالت الأسفلت القديم) ؛ أعمال الإنارة (إعادة تأهيل أعمدة الإضاءة وتوفير أعمدة جديدة عند الحاجة) ، وتحسين وتركيب مجاري الصرف الصحي، وبناء الجدران الدعم، وتركيب حواجز الأمان، ووضع العلامات وإشارة المرور. سوف توفر أعمال إعادة التأهيل فرص عمل لحوالي ٥٥ عاملاً وسوف تتطلب ما بين ١٢ شهرًا و ١٨ شهراً لإنهاء الأعمال.

الاطار القانوني

سوف يتم تنفيذ خطة الإدارة البيئية والاجتماعية وفقًا لسياسات البنك الدولي وبحسب القوانين والأنظمة اللبنانية ، ولا سيما القانون رقم ٢٠٠٢/٤٤٤ (قانون حماية البيئة).

إن مشروع الطرق والعمالة في لبنان يتبع سياستان وقائيتان من سياسات البنك الدولي هما سياسة التقييم البيئي رقم (OP 4.01) وسياسة إعادة التوطين القسري (غير الطوعي) رقم (OP 4.12). وحيث أن المشروع المنوي إنشائه يركز بشكل رئيسي على إعادة تأهيل الطرق موجودة سابقاً، فإنه سوف يتم العمل في إتباع سياسة العمليات المرتبطة بالتقييم البيئي رقم (.OP 4.01).

وفقاً لمكونات مشروع التأهيل في قضاء جبيل فإنه لن تتم إعادة التوطين القسري أو إستملاك أراضي. وعليه، فلن يكون هناك أي نازحين و/أو مهجرين بسبب أنشطة المشروع (وهذا يشمل السكان المحليين واللا جئيين السوريين) مما لا يتطلب تطبيق سياسة إعادة التوطين القسري (غير الطوعي) رقم (OP 4.12).

مشاورة العامة

تمت المناقشة والتباحث ببنود خطة الإدارة البيئية والاجتماعية مع المعنيين بشكل علني، بحيث هدف التشاور إلى التأكد من موافقتهم على القضايا الحساسة لأجل تحسين فرص عدم تعرض للمشروع وخلق نزاعات تؤدي لتوقفة و/او إلغائه.

تم ترتيب لقاء مشاركة عامة في قضاء جبيل بحيث حضره ١١ شخصا، من بينهم أربع نساء. خلال اجتماع المشاركة العامة الذي عقد في اتحاد بلديات جبيل يوم الأربعاء ١١ ديسمبر ٢٠١٩، تم إبلاغ الحضور بأهداف المشرو ، وتقديم شرح عن تصميم المشروع، وتعداد الموارد الطبيعية والاقتصادية والاجتماعية المحددة ذات الأهمية في منطقة المشروع. كما وتم التباحث بالمخاطر البيئية والاجتماعية المحتملة وتدابير التخفيف المخطط لها وطرق المراقبة لضمان نجاحها.

أبدا الحاضرون قلقهم بشكل رئيسي من فعالية خطة المراقبة، مما أوجب تقديم شرح من قبل الشركة الإستشارية بمساعدة ممثل مجلس الإنماء والإعمار عن عملية المراقبة لهذا المشروع، كما وتم التذكير بدور البلديات والمجتمعات المحلية في المراقبة خلال مرحلة إعادة تأهيل المشروع لزيادة نسبة الفعالية. علاوة على ذلك، أوضح ممثل مجلس الإنماء والإعمار أن خطة الإدارة البيئية والاجتماعية تتضمن آلية لمعالجة الشكاوى من أجل ضمان متابعتها بشكل صحيح ومرضي.

وصف بيئة المشروع

تمت دراسة البيئة الفيزيائية والكيميائية والبيولوجية والاجتماعية والاقتصادية ضمن منطقة المشروع في الوضع الحالي وقبل تنفيذ المشروع. إذ قام فريق العمل بجمع البيانات الأساسية وإجراء المسح الميداني للعناصر البيئية التالية: جودة الهواء وجودة المياه وجودة التربة والظروف الجيولوجية ووضع المناخ والأرصاد الجوية والموائل الطبيعية والتنوع البيولوجي واستخدام الأراضي / الغطاء الأرضي ونسبة الضوضاء والموارد الثقافية والظروف الاجتماعية الاقتصادية (فرص العمل وتوفر اليد العاملة والمشاكل الاجتماعية والاستغلال و/أو الانتهاك الجنسيين الناجمين عن العمل والتحرش الجنسي والصحة والسلامة المهنية).

نصت الدراسة على أن الوضع الجيولوجي ضمن الطرق المقترحة لناحية الطبقات الصخرية المتكشفة والطبقات الجوفية والتكوينات التكتونية (فوالق ، طيات ، الوضع الزلزالي ، إلخ) ، الهيدروجيولوجيا (المياه الجوفية ومياه البحر) والهيدرولوجيا (المياه السطحية والأنهر). أظهرت الدراسات بأن التكوينات الصخرية البارزة في منطقة الدراسة وحولها تنتمي إلى الحقبة الزمنية الجيولوجية الطباشيرية (Cretaceous geological time period). ويقع كلا الطريقين (جبيل R3 وجبيلR4) على تكوينات قابلة للتفاذ مما يعرض طبقات المياه الجوفية إلى تلوث محتمل في حال حدوث تسرب.

تعتبر جودة الهواء أيضًا عنصرًا أساسيًا في تقييم الرفاهية الاجتماعية والحالة الصحية للمجتمع. اعتمدت الدراسة على معطيات مشروع برنامج الأمم المتحدة الإنمائي / وزارة البيئة "تقييم جودة الهواء في دولة شرق البحر الأبيض المتوسط: الوضع في لبنان"، والتي أظهرت أن مستويات أحادي أكسيد الكربون وثاني أكسيد الكبريت والأزون وثاني أكسيد النيتروجين و نسبة تطاير الغبائرPM10 هي ضمن القيم الحدية الوطنية (المحددة بموجب القرار ١/٥٢ بتاريخ ١٩٩٦). تجدر الإشارة إلى أن الأنشطة الرئيسية ضمن أعمال التأهيل لن تشمل أعمال تؤدي لتلوث الهواء.

أما فيما يتعلق بالموائل الطبيعية والتنوع البيولوجي ونظرًا لطبيعة المشروع، فإن منطقة التأثير المباشر تتعلق بالطرق القائمة ولن يتم شق أي طريق جديدة. وعليه، تم إجراء تقييم بيولوجي سريع لتقدير الوضع البيئي للمناطق المجاورة للطرق المقترحة، كما وتقييم لتنوع النباتات وتحديد الأنواع المهددة بالانقراض أو المدرجة في الاتحاد الدولي لحفاظ على الطبيعة والتي يمكن أن تصبح في دائرة الخطر عند تنفيذ المشروع المقترح. وقد أظهر التقييم أن طريق جبيل R4 يمر عبر موطن طبيعي (حرج) في منطقة منصف (وادي غابات كثيفة) مما يحتم الحاجة إلى عناية خاصة خلال مرحلة إعادة التأهيل. بالإضافة إلى ذلك، تبين أن طريق بجبيل R3 هي بحاجة إلى تدابير خاصة كون الطريق تمر بجانب محمية بنتايل الطبيعية. وأخيرًا، تجدر الإشارة إلى أن طريقي جبيل R3 وجبيل R4 هما يمران بالبقرب من أنهر ومجاري مياه حيث تم ملاحظة بعض أنواع بيولوجية معينة (نباتات شاطئية نهرية)، كون تعتبر الموائل النهرية ملجأً هامًا للبرمائيات والطيور والزواحف.

كما وتم إجراء مسح اجتماعي اقتصادي في منطقة المشروع من أجل تبيان الوضع الديموغرافي والاجتماعي والاقتصادي على مستوى قضاء جبيل.وعليه، تم التحقيق في مجموعة من المؤشرات الاجتماعية بما في ذلك الوضع السكاني في جبيل (العمر وتوزيع الجنس) والعمالة وسبل العيش وتوافر التعليم العام والخاص والمؤسسات الصحية ومستوى الخدمات الصحية والمستوى التحصيل العلمي وسهولة الوصول إلى المرافق العامة والخدمات المجتمعية وأنماط استخدام الأراضي ووضع الآثار والإرث الثقافي ومدى تأثر القضاء بمجريات الأزمة السورية لناحية تواجد النازحين. سمح التقييم باستخلاص استنتاجات بشأن الآثار المحتملة للمشروع على الظروف الاجتماعية والاقتصادية لمنطقة الدراسة. وباختصار ، فإن بعض أجزاء جبيلR3 ، وجبيل R4القسم ١ هي متطورة حضرياً.

أم فيما يتعلق بالمواقع الحساسة التي يمكن أن تحيط بالطرق المقترحة للتأهيل،فإنه يحيط بطريق جبيل R3 العديد من المواقع الحساسة مثل الكنائس والمدارس التي تقع على مسافة أقل من ١٠ أمتار من خط سير الطريق. أما فيما خص الطريق رقم جبيل R4فإن أماكن العبادة قليلة التواجدعلى طول خط الطريق القسم ٢. علاوة على ذلك ، تم تبيان الأراضي الزراعية المجاورة التي قد تتأثر بشدة في بعض أجزاء جبيل R3 وجبيل R4 القسم ١ والقسم ٢

تقييم الاثار البيئية و الاجتماعية

إن الهدف من هذا القسم هو تحديد وتقدير جميع الآثار المحتملة، السلبية والإيجابية للمشروع على الوضع البيئي خلال مرحلتي إعادة التأهيل والتشغيل. ولذلك تم دراسة تقييم آثار المشروع المقترح على جودة الهواء وجودة المياه وجودة التربة وجودة الهواء ونسبة الضوضاء والتلوث النظري واستخدام الأراضي / الغطاء الأرضي والآثار الاجتماعية والاقتصادية.

فيما يتعلق بمرحلة التشغيل ، يستلزم التقييم "فترة الضمان" التي يتحمل خلالها المقاول مسؤولية أنشطة الصيانة.

كون المشروع يهدف بشكل أساسي إلى تحديث الطرق القائمة، فمن المتوقع أن تشمل الآثار البيئية الغبار الناتج أثناء أعمال إعادة التأهيل وزيادة التلوث الضوضائي الناتج عن آلات البناء وتدهور جودة المياه وتعطيل حركة المرور والأضرار المحتملة للمرافق القائمة واضطراب التنوع البيولوجي.

وعليه فإنه تم تقييم الآثار خلال مرحلة إعادة التأهيل على نوعية الهواء والماء على أنها مباشرة ولا يمكن عكسها. تتطلب مرحلة إعادة التأهيل استخدام العديد من الآلات والمعدات الثقيلة التي ترتبط عادة بالتأثيرات على جودة الهواء مما يؤدي إلى توقع حدوث انبعاثات للغبار والروائح المزعجة خلال هذه المرحلة. أما الآثار المحتملة على جودة المياه من أنشطة إعادة التأهيل فهي مرتبطة بحدوث تسرب ملوثات عرضية وعند جريان المياه السطحية.

بالإضافة إلى بعض الاضطراب المؤقتة المتوقعة على الأنظمة البيئية الطبيعية (التلوث الضوضائي والتلوث المحتمل للتربة والمياه)، فإنه قد يحدث تأثير سلبي مباشر على النباتات والسكان إذا تم إلقاء النفايات (الحفريات) بشكل مباشر ضمن الأراضي على جانبي الطريق وعند النظم البيئية الشاطئية. إلا أنه ونظرًا لأن الطرق المقترحة تتضمن عمومًا نشاطات بشرية، فإن من المتوقع أن تقتصر التأثيرات المحتملة للمشروع على التنوع البيولوجي المحلي عبر حدوث اضطراب للنظم البيئية الطبيعية والحيوانات المحلية عندما تكون الطرق محاطة بالغابات (مثال المنصف ضمن طريق جبيلR4)، أو عبر إلقاء النفايات بشكل غير قانوني في الجداول والأنهار والوديان التي يمكن أن تؤدي إلى تدمير مباشر للتنوع البيولوجي المحلي والموائل الطبيعية. كما وإن تراكم الغبار على النباتات والأراضي الزراعية القريبة ضمن كريقي جبيل R3 وجبيل R4 قد يسبب بعض الاثار السلبية على نوموا هذه النباتات والمزروعات.

تشمل المخاطر الاجتماعية المحتملة المتعلقة بالمشروع:
(١) تدفق اليد العاملة (في حالة عدم توظيف المقاول للعمالة من المجتمع المحيط بها) والمخاطر المحتملة تجاه العاملات من النساء في المجتمع المحيط (بسبب قرب السكان والمدارس من الطرق المراد إصلاحها) ؛ (٢) الخطر المحتمل لعمل الأطفال ؛ (٣) ظروف العمل السيئة ؛ (٤) عدم الرضا عن تخصيص الوظائف ؛ (٥) خطر نقص مشاركة المرأة أو قلة تقدير دور النساء ؛ (٦) الإزعاج بشكل عام وإضطراب المرور ؛ (٧) عرقلة مؤقتة لسهولة الوصول إلى المواقع الحساسة.

أما من الناحية الإيجابية فإنه من المتوقع أن تخلق الآثار الاجتماعية الإيجابية للمشروع فرص عمل قصيرة الأجل للسكان المحليين واللاجئين السوريين الذين سيقومون بأنشطة إعادة التأهيل.

بمجرد إتمام أعمال التأهيل، فإنه من المتوقع أن يؤدي المشروع إلى تحسين ظروف السلامة على الطرق والحد من حوادث المرور وازدحام المرور وفي نهاية المطاف تعزيز فرص كسب العيش. من ناحية أخرى ، يمكن أن تنتج الآثار البيئية المتوقعة الرئيسية على المياه والتربة من أنشطة الصيانة خلال "فترة الضمان" التي يتحمل خلالها المقاول مسؤولية أنشطة الصيانة إذا لم تتم إدارتها بشكل صحيح.

خطة الإدارة البيئية والاجتماعية

تعتبر خطة الإدارة البيئية والاجتماعية ضرورية لضمان الحفاظ على التأثيرات المحددة ضمن المستويات المسموح بها وتخفيف الآثار السلبية غير المتوقعة في مرحلة مبكرة وتحقيق فوائد المشروع المتوقعة. وبالتالي فإنه من أجل التخفيف من الآثار السلبية و/أو المخاطر المحددة، فقد تم إعداد خطة الإدارة البيئية والاجتماعية لطريق جبيل قبل الشروع في أي أعمال مدانية. إن الهدف من خطة الإدارة البيئية والاجتماعية هو المساعدة في التعرف السريع على المشكلات وتشجيع الإجراءات الفعالة لتصحيحها وتحقيق الهدف من تطبيق الخطة البيئية والاجتماعية في نهاية المطاف. إن الفهم السليم للأولويات والسياسات البيئية وإدارة المشروع بشكل صحيح وتحديد المتطلبات التنظيمية وتحديث المعلومات المتعلقة بفترة التشغيل هي أمور أساسية لضمان الأداء البيئي الفعال والمرضي.

قد تم توفير خطة إدارة مناسبة لمتطلبات محددة ضمن مشروع طرق جبيل الموضحة في التقييم البيئي والاجتماعي الذي تم إجراؤه. تتضمن الخطة تدابير ومعدات للتحكم في انبعاثات العوادم وانبعاثات الغبار والروائح وأنشطة معالجة التربة خلال مرحلة إعادة التأهيل. علاوة على ذلك، تم توفير التدابير التوجيهية المناسبة للسيطرة على التسربات العرضية لمواد البناء لمنع تلوث التربة والمياه الجوفية.

فيما يتعلق بالتنوع البيولوجي ، يتم تقديم التوصيات لتوجيه مقاول المشروع في الحد من الآثار السلبية على الموائل الطبيعية والتنوع البيولوجي. تضمنت إجراءات التخفيف المقترحة في خطة الإدارة البيئية والاجتماعية توصيات بشأن أعمال إعادة التأهيل والجداول الزمنية وإدارة النفايات الصلبة لتجنب تدهور المواقع أو إزعاج الحيوانات المحلية. يجب أن يلتزم المقاولون بالحذر أثناء أعمال إعادة التأهيل حتى تكون الآثار المباشرة على الأنظمة البيئية والحيوانات المرتبطة بها ضئيلة. يجب اعتماد خطة إدارة النفايات لتجنب تلوث التربة والمياه التي يمكن أن يكون لها آثار لا رجعة فيها على التنوع البيولوجي. وبعبارة أخرى، لا ينبغي إلقاء حطام ناتج عن إعادة التأهيل في الموائل الطبيعية (مثل الوديان والأنهار) ويجب ألا تتم أنشطة إعادة التأهيل خلال موسمي هجرة الطيور لتجنب إزعاج طيور (إذا أمكن).

يمكن التخفيف من المخاطر الاجتماعية لهذا المشروع من خلال المراقبة الدورية لظروف العمل والبنود المحددة المطلوبة ضمن العقود لحماية العمالة وتجنب العنف القائم على نوع الجنس . توجد الخطة القواعد السلوكية البيئية والاجتماعية للمقاول على النحو التالي:
(١) الأفضل توظيف عمال محليين ، (٢) عدم توظيف أفراد دون سن العمل القانوني وفقًا لقانون العمل في لبنان (٣) ضمان الامتثال والتنفيذ المناسبين لقواعد السلوك وبالمثل ، يوصى بالتنسيق الوثيق مع البلديات المتضررة فيما يتعلق بقضايا عرقلة الطرق. بالإضافة إلى ذلك ، يجب إبلاغ آلية معالجة المظالم بوضوح لجميع الأشخاص المتأثرين بالمشروع أثناء تنفيذ المشروع وقبله.

علاوة على ذلك، أنتجت خطة الإدارة البيئية والاجتماعية مؤشرات رئيسية للمشروع لرصد نجاح تنفيذ المشروع وهي مصممة لضمان الفعالية في قياس النتائج الرئيسية للمشروع على أساس مؤشرات قابلة للقياس. يمكن رصد مخاطر الآثار البيئية والاجتماعية (مثل مراقبة التخلص من النفايات الصلبة وتصريف مياه الصرف الصحي ومراقبة العمالة القاصرة ومراقبة سلوكيات العمال أثناء أعمال إعادة التأهيل.). ستقوم مجلس الإنماء والإعمار بمراقبة المشروع لضمان تنفيذ الخطة بما يتماشى

مع الأهداف المقترحة وأنه يسير على الطريق الصحيح لتحقيق النتائج المتوقعة. كما وسيقوم بإعداد التقارير المرحلية للمشروع وتقديمها إلى البنك الدولي للمراجعة.

وأخيراً ، تم إنشاء آلية معالجة المظالم متعددة البنود للطرق المعنية في قضاء جبيل. بحيث تتضمن تحديد أي شكوى والتعامل معها بشكل صحيح وضمن الجدول الزمني المحدد.

الخلاصة

ظهرت التقييمات أن المشروع المقترح له آثار محتملة هي معاكسة ومفيدة على البيئة الحالية. وفي هذا السياق، يجب يلتزم المقاول بوضع عدة تدابير للتخفيف من الآثار السلبية على البيئة والسلامة والصحة والاجتماعية المرتبطة بتطوير المشروع وبالمعايير والسياسات الاجتماعية والبيئية للبنك الدولي.

1. Introduction

1.1 Project Background

The Roads and Employment Project (REP) funded by the World Bank (WB) aims to improve the efficiency of road sector expenditures through the prioritization of road works and the improvement of road asset management techniques.

The project will have the following components:

- Component 1: Roads Rehabilitation and Maintenance
- Component 2: Improving Road Emergency Response Capacity
- Component 3: Capacity Building and Implementation Support

This ESMP report only deals with the first component of the REP project. This includes the rehabilitation and maintenance of primary, secondary, and tertiary roads, including road safety and spot improvements. The investments under this component will improve transport connectivity and create jobs for Lebanese and Syrians.

A set of criteria were decided upon to objectively select the roads to be rehabilitated. The main criteria are pavement and road safety condition; traffic level; road functional classification; fairness in road distribution between different towns; and finally, potential for job creation and other socioeconomic benefits.

The project covers classified roads in 25 Cazas[1] throughout Lebanon with an expected total length of 835 km and grouped into six lots as follows:

- Lot 1: roads in Cazas of Jbeil, Kesrouane and El Maten.
- Lot 2: roads in the Cazas of Aley, Baabda, Chouf and Zahle.
- Lot 3: roads in the Cazas of Bent jbeil, Hasbaya, Jezzine, Marjaoun, Nabatiye, Rachaya, Saida, Sour and Bekaa West.
- Lot 4: roads in the Cazas of Akkar, Minieh-Danniyeh and Zgharta.
- Lot 5: roads in the Cazas of Batroun, Bcharre, Koura and Tripoli.
- Lot 6: roads in the Cazas of Baalbeck and Hermel.

The maintenance and rehabilitation activities include asphalt overlays, drainage works, base and subbase reconstruction on selected sections, slope stabilization works, retaining walls, road safety activities (edge safety barriers, marking, signing, etc...) as well as roadside improvements.

Considering that the anticipated civil works will result in environmental and social impacts, an environmental and social management plan (ESMP) shall be prepared under the requirements of OP4.01, that classifies the project as Category B. Accordingly, Dar Al Handasah Nazih Taleb & Partners will develop an Environmental and Social Management Plan for Lot 1 and Lot 2 as it

[1] Caza is a synonym of District: Second largest administrative division below the national level. Each governorate is divided into districts or cazas (REACH, 2015). Lebanon is divided into six administrative regions (called Governorate or Mouhafaza) and 25 sub-regions (called Caza) not including Beirut.

was assigned by the CDR to prepare all the tender documents needed for the rehabilitation of roads included in these lots under CDR contracts No.20373 and No.20374.

This report is the specific ESMP for Jbeil Caza (LOT 1) and is structured as follows:

Executive Summary
Chapter 1 – Introduction;
Chapter 2 – Existing Policies and Regulatory Framework
Chapter 3 –Description of the Proposed Project
Chapter 4 – Description of the Environment and Social Context
Chapter 5 –Potential Environmental and Social Impact
Chapter 6 – Mitigation of Environmental and Social Impacts
Chapter 7– Environmental and social Management and Monitoring Plan
Chapter 8 – Consultation, Disclosure and GRM
Chapter 9–Conclusion
References
Annexes

1.2 Project Rationale

According to the World Economic Forum's (WEF) Competitiveness Index 3 Lebanon's infrastructure is the second main restriction to growth and its supply and quality is substantially below various sets of comparator countries. This situation can further threaten the country's delicate political, social, and economic situation. As the influx of Syrian refugees continues to increase, the capacity of the existing and deteriorating infrastructure will no longer be appropriate to meet the excess demand, and pressing public investments will be needed. In other words, road rehabilitation needs have been heightened by the influx of Syrian refugees, which has substantially increased traffic demand and the utilization of the road network.

More specifically, according to the Global Competitiveness Report of the World Economic Forum in year 2018, Lebanon ranks as the 127th for quality of roads out of 140 studied countries, and achieved a very low score of 2.6 out of 7. Moreover, in terms of road connectivity, Lebanon ranked 95 and achieved a poor connectivity score index of 48.7 out of 100 (Schwab, 2017). In terms of road conditions, approximately 95% of the roads are paved but lack proper maintenance. In Lebanon, road traffic injuries are growing to be a public health and developmental concern. Yearly, more than 1,000 people are killed due to road conditions, where one-third of the mortality cases happen to pedestrians, motorcyclists, and other vulnerable groups (Choueiri et al., 2013). Moreover, Lebanon has one of the highest per capita rates of road accidents in the world. The World Health Organization estimated that the total number of road traffic fatalities in 2015 to be 1,088, and their associated economic cost is between 3 percent and 5 percent of GDP (World Bank, 2017).

To deal with increasing road traffic and safety challenges, the Lebanese Government announced the implementation of "Road and Employment Project" which aims to improve transport connectivity and to create direct and indirect jobs for Lebanese and Syrians.

However, infrastructure projects can exert a substantial strain on the environment and natural resources. Sustainable infrastructure designs are the only solution to reduce the built-up pressure and promote the well-being of local communities. With sustainable practices and proper waste

management plans enforced, the burden on the environment can be reduced. Sustainable construction can generally be defined and achieved by satisfying the following criteria: increase the lifetime; limit material consumption; use durable materials; and; consider the environmental impact of the construction process (Hoeckman et al, 2012). Similarly, the socio-economic effects of infrastructure projects can be reduced through transparency and fair compensation processes (Morris, 2007). In this context, integrating environmental and social issues and concerns in development plans and strategies would be crucial in the context of Lebanon's commitment to sustainable development. This ESMP prepared for economic decisions and development to go hand in hand with environmental and social protection. Accordingly, the developed ESMP should be viewed as a decision-making instrument for growth and environmental protection and should not be considered as a development restraint.

1.3 Report Objectives

The main aim of this study is to bring into focus all the environmental and social aspects that could affect directly and indirectly the project area and the society. This study will enable the project developers and the authorities to consider the potential environmental and social consequences, and accordingly ensure that mitigation measures, monitoring plans and contingency strategies are provided to mitigate these identified negative impacts.

This ESMP for Jbeil Caza was developed in accordance with environmental laws and regulations in Lebanon and WB guidelines to ensure that all environmental and social requirements related to the project are properly implemented by the selected contractor during the rehabilitation phase of the project and by the concerned municipalities and MoPWT during the operation of the project.

The specific objectives of this ESMP are to:

1. Establish environmental and socio-economic baseline
2. Set the Legal, Institutional, Standards & Policies Frameworks
3. Conduct an inclusive public consultation session that takes into consideration the views of PAPs to feed into project design
4. Identify potential social and environmental impacts caused by the project
5. Manage the various environmental and social impacts by specifying several project specific mitigation measures, as stated in the Environmental and Social Management Framework (ESMF) document prepared by CDR;
6. Achieve feasible and applicable mitigation measures during all the project's phases;
7. Provide appropriate compensation for any loss caused by project implementation;
8. Emphasize, improve, and enhance the positive outcomes of the project;
9. Guide on creating short term jobs for communities within a gender workforce equality environment;
10. Identify the responsible authorities and assign roles for different organizations in the efficient implementation of this ESMP.
11. Ensure transparency throughout the project preparation and implementation
12. Implement a robust GRM that is clearly communicated to all project affected people.

1.4 Methodology

This ESMP report was prepared by Geoflint s.a.r.l at the request of Dar Al Handasah Nazih Taleb & Partners, as a fulfillment of the environmental and social requirements stated in component 1 of the REP project.

The report (1) provides the relevant information regarding the environmental and social baseline conditions prevailing along the chosen roads to be rehabilitated in Jbeil (Jbeil R4 and Jbeil R3 that are part of Lot1 and have a total length of 28.42 km, refer to Figure 1-1, (2) discusses the project activities, (3) identifies the possible adverse impacts during both road rehabilitation and operation, and (4) sets out an ESMP for the two roads within Jbeil Caza to alleviate or prevent any likely negative impacts on the neighboring environment.

The methods used for setting the data collection and stakeholders's engagement are elaborated in this chapter.

1.4.1 Collection of Environmental and Social Baseline information

Baseline data (environmental and social baseline information) were collated in conjunction with the project design concept and plans to highlight issues and opportunities identified within the site location and to inform the project proponents about any constraints or potential impacts.

Available data was collected from concerned municipalities, literature review, and field survey and side meetings when needed for the social assessment.

Meteorological data, which play a vital role in transport and dispersion of air pollutants, were investigated and collected in shape of a statistical distribution of weather conditions over a period of time. Also, the ambient air quality for the targeted areas was acquired from the Ministry of Environment (MoE) in order to assess the social wellbeing and health status of the communities. In addition, water quality of nearby water resources was investigated in order to accurately assess the potential impacts of the rehabilitation works. The geology, hydrogeology and seismicity of the targeted areas were studied in order to identify any viable water resources and define the level of seismic hazards of the area.

Site visits were conducted for road, social, acoustic environment and natural habitat assessments. Regarding natural habitat assessment, a single field visit was set for each road (given the limited timeframe of this study). The field investigation did not aim for an exhaustive inventory of the biodiversity of the project area but a general overview of present species (mainly flora) and key habitats. This general approach allows the identification of the conservation status of the natural habitats. Walking transects were recognized to obtain an understanding of the vegetation communities in the area and record existing species. Knowing that a single visit is not enough, the study had to consider some species as potentially present and it was difficult to perform a complete faunal survey. Further, Land Use Land Cover (LULC) maps were generated for the concerned areas.

Regarding the social assessment, socio-economic information about the area was obtained from several national sources and studies, as well as from the Ministry of Social Affairs (MoSA), and informal meetings with municipal council members during the field visits. Moreover, sensitive

receptor maps were generated for the concerned roads in Jbeil for a better understanding of the project potential social implications.

1.4.2 Methodlogy for Stakeholders Engagement

According to Bourne (2016), every stakeholder and every stakeholder community is unique and has their own distinct set of expectations and perceptions. Engaging with and influencing such diverse parts within a community through a traditional "one-size-fits-all" approach is no longer deemed effective. As a result, an operative communication strategy was set, accounting for the complexity of the people whose support and involvement are vital to project success.

Multiple communication means were used to secure stakeholder involvement. The aim was that project's stakeholders become aware of the project's components and results, and that they get prepared to have the needed involvement in the work.

The Stakeholder Circle methodology was used as it provides a flexible approach for defining the stakeholder community, and recognizing the information and communication needed to influence each stakeholder's prospects and actions.

The five steps to the Stakeholder Circle methodology (Bourne, 2016) were conducted and are listed below.

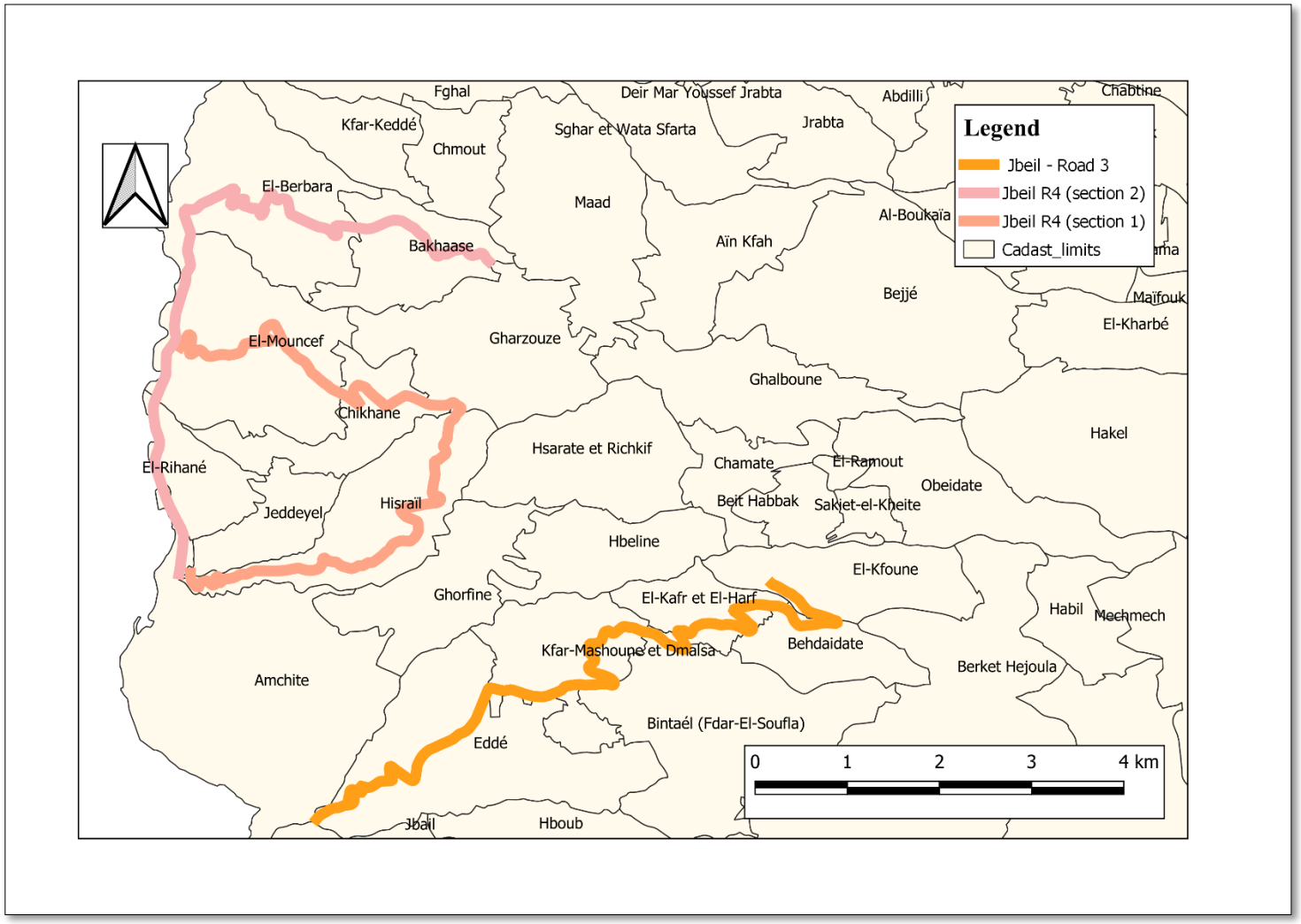
1. Identification of all stakeholders
2. Prioritization to determine who is important
3. Visualization to understand the overall stakeholder community
4. Engagement through effective communications
5. Monitoring the effect of the engagement.

The aim was to understand stakeholders' needs, identify support from the key positive stakeholders, and reduce opposition from negative stakeholders.

Subsequently, a directed communication with the identified important stakeholders was conducted. The aim was to make as much information as possible easily accessible. Additional different channels to deliver information were used (this includes formal and informal channels).

Emails, letters, and direct phone calls were adopted to personalize the direct communication done with the main identified stakeholders. Finally, a formal invitation letter was sent to all stakeholders in relation to the arranged formal public meeting at the Union of Jbeil Municipalities building.

Figure 1-1 Lot 1 – Roads Key Plan Drawing (Jbeil roads)



Source: Geoflint s.a.r.l. & Dar Al Handasah Nazih Taleb & Partners, 2019

2. Existing Policies, Legal and Administrative Framework

The environmental, economic and social implications of the proposed project must be addressed within the context of applicable legal and policy framework impacting the decision-making process at the national, regional and international levels. More specifically, the ESMP is conducted in accordance with the World Bank Safeguards and national and international laws/regulations that are related to social and environmental impact assessments.

The project must comply with environmental regulations, labor and occupational health and safety laws to avoid adverse impacts on the environment, health and safety of workers and affected communities. More specifically, it must comply with Lebanese Labor laws, ILO Labor standards, applicable collective agreements and international Human rights conventions.

2.1 Applicable Legal and Regulatory Framework

This section detailing the applicable legal provisions aims to provide a review of relevant national and international legal instruments as well as legislation, regulations, and policy documents, which are applicable to the proposed project in the Republic of Lebanon. The following table presents an overview of the main Lebanese environmental legislations dealing with the management of natural resources, solid waste and wastewater as well as air quality and pollution control. Moreover, laws, decisions in relation labors, human rights and biodiversity are elaborated in this section as well.

Table 2-1 National Applicable Legal Framework

Relevant Sector	Legislation	Date	Brief Description	Relevance to The Project
Environment	Decree 2761	19/12/1933	Guidelines related to Wastewater Management and Disposal	Wastewater generated by the project activities should be managed and disposed of according to this decree. This decree provides guidelines related to wastewater management and disposal to avoid pollution caused by the discharge of liquid waste illegally into water streams and valleys.
	Decree 8735	23/081974	All generated rehabilitation solid wastes are to be properly collected, handled and disposed	Solid wastes generated by project activities should by managed according to guidelines set in this decree.
	Law 558	24/071996	Law for the protection of forests	The requirements of the law shall be adhered to for the protection of forests.
	MoE Decision 52/1	29/06/1996	Environment quality standards and criteria for air, water and soil pollution. Revised standards for water, air and soil pollution (partly updated in Decision 8/1 dated 30/1/2001).	Decision 52/1 was referenced in the study to specify the National Standards for Environmental Quality and the Environmental Limit Values for Air and Water. The described decision (Annex 12 in decision 52/1) was used for monitoring air emissions.
	MoE Decision 8/1	30/01/2001	Amendment to part of MoE Decision 52/1 dated 29/6/1996. National Standards for Environmental Quality (NSEQ)	This decision will be used to monitor air and water quality during implementation of project activities.

			that covered air and liquid emissions for all sectors.	
	Law 444	29/07/2002	Environment Protection Law: Fundamental principles and public rules (7 parts, 68 articles), Organization of environmental protection, Environmental information system and participation in the management and protection of the environment, Environmental Impact Assessment, Protection of environmental media, Responsibilities and fines, Other regulations (miscellaneous, institutional).	It is essential for the proposed project as the protection of the environment is a must throughout all of the steps of the project.
	Decree 8803/2002 and its amendments	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
	Law 77	13/04/2018	Water Resources Law	Penalizes unauthorized discharges or disposal of any kind of waste in water resources
	Law 78	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
	Law 80	10/10/2018	Integrated Solid Waste Management which sets integrated solid waste management principles and provides guidelines for the management of waste.	Solid waste generated during the project should be managed in accordance with Law 80, which includes limiting quantities generated when possible, as well as properly disposing of any generated waste.

Health and safety	Law 64	12/8/1988	Protection against hazardous wastes that could harm air, water, biodiversity, soil, and people.	Precautionary measures should be taken to limit any potential damage from generated hazardous wastes (if any)
	Decree 11802	30/01/2004	Occupational health and safety decree	The occupation health and safety conditions during the rehabilitation period should comply with this decree.
Labor Laws	Labor Law	23/09/1946	Labor Law that sets basic labor rights in Lebanon including minimum working age, working and resting hours etc.…	It protects employees from any sort of violations dictated in this law.
	Law 335	2/8/2001	This law is the ratification of ILO convention No. 182: The agreement required the ratifying country to take immediate and effective measures to prohibit the worst forms of labor and eliminate it and specify the types of work that harm the health, safety or ethical behavior of children and their location.	Does not allow the employment of children and protects them from engaging in any work activities that could harm their health and safety.
	Law 400	5/6/2002	This law is the ratification of ILO convention No. 138: This agreement aims to develop a general instrument on the subject of minimum age for employment to gradually replace the instruments applied in specific economic sectors, aiming to completely eliminate child labor	Minimum age of employment on tasks and works that pose risks or hazards to health and safety
	Decree 8987	29/09/2012	Prohibition of employment of minors under the age of 18 in work	Adhere to the requirements of this decree with regards to employment for this project.

			that may harm their health, safety or morals	
	Decree 3791	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.
Traffic	Law 243	22/10/2012	Aims at the elimination of any kind of traffic violations such as: exceeding the speed limit, driving without a license or driving under any substance alternating the normal mental and physical state.	All transportation vehicles utilized during project implementation should abide by the general rules specified in Law 243.
General	Decree law 166	7/11/1933	Antiquity law	Defines chance find procedures that should be followed in case antiquities were identified in the project site
	Decree 340	01/03/1943	The text of Article 522 of the Lebanese Penal Code, applies to cases of assault of women, by force, violence, and manipulations which are acts that affect a woman's dignity, physical health, psychological state, and moral integrity.	This law was mentioned as the project may hold risks on women during rehabilitation work.
	Law 118	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.
	Law 58	29/05/1991	Law of properties and expropriation	Despite that no expropriation activities will be done; this law is added because OP 4.12 was triggered by the project
	Law 53	14/09/2017	Abolishment of article 522 of the penal code that exempts a rapist	This law was mentioned as the project may hold risks on women

			from punishments if he marries a victim	during rehabilitation works (influx of workers (men) to the concerned area).

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 arelimited to the affairs of the ministry that promulgated it.Ministerial Decisions are subject specific.

2.2 Institutional Framework

Institutional and Implementation Arrangements

The project works will be executed on the main road network which is under the jurisdiction of the Ministry of Public Works and Transport (MoPWT). MoPWT is in charge of the construction and maintenance of the main road network, consisting of the primary, secondary, and tertiary roads.

In Lebanon, donor-funded road works projects are implemented by CDR upon the request of the Council of Ministers (CoM). Therefore, in the context of REP project, CDR will execute the project on behalf of the government/MoPWT.

The main national institutions that are in relation to this project and their corresponding mandates are presented in the table below.

	Roles and Responsibilities
MoPWT	MoPWT is responsible for the management of public roads, and for developing a sustainable strategy for the transportation sector within the urban and rural areas. • MoPWT will work closely with CDR during project implementation to ensure that important decisions on road (selection priorities, road designs, equipment specifications, and road asset management) are well coordinated. • MoPWT will be responsible to manage the rehabilitated roads upon the completion of the project.
CDR	The Council for Development and Reconstruction is a public institution established through Decree No. 5 dated 31st January 1977. CDR's main responsibilities is to: • Coordinate with relevant government agencies and with the relevant government agencies, particularly MoPWT, regarding roads priorities, technical aspects, and project's requirements. • Monitor the project. In particular, every six months CDR must submit to the Bank project progress reports summarizing all project aspects and progress achieved in project implementation.
Municipalities[2]	• Municipalities are responsible for their municipal area. According to Decree 118/1977, municipalities are responsible for supervising projects' implementation in their municipal territories. In this context they were consulted for this project. •
Ministry of Environment (MoE)	• MoE is responsible for planning and monitoring of environmental issues. • MoE is in charge of protecting the environment in general, setting regulations and standards, and advising on implementing projects and programs in a sustainable manner. Accordingly, this ESMP must comply with the Lebanese environmental standards and regulations issued by MoE.
Ministry of Agriculture (MoA)	• MoA is responsible for monitoring all activities related to forestry and agriculture. It regulates the introduction of new species in agriculture and livestock, protects, supervises and manages natural resources and provide technical assistance whenever necessary. • The REP will not involve the construction of new roads or widening of existing ones (i.e. no tree cutting will occur). However, in the context of building retaining walls,

[2] Jbeil R3: Edde, Kfar-Mashoune et Dmalsa, Bintael, El-Kafr et El-Harf, Behdaidate, El-Kfoune
Jbeil R4: El-Rihane – Hisrail – Gharzouze – Chikhane – El-Mouncef - Baachta – El-Berbara - Bakhaase

	if the contractor had to cut native trees, the MoA must be consulted. Tree cutting permits are provided by MoA.
Ministry of Labour(MoL)	• MoL is responsible for all labour and employment issues. Labour inspection is the responsibility of the Department of Labour Inspection, Prevention and Safety (DLIPS) under the Labour Relations Authority of the MoL. • DLIPS supervises the implementation of all laws, regulations, decrees and rules pertaining to the terms and conditions of employment, and the protection of workers in the workplace, including the provisions of international labour Conventions ratified. Labour inspectors ensure the supervision of compliance with regulations regarding conditions of employment and protection of workers including occupational safety and health. This ESMP must be in accordance with labor laws, regulations and conventions.

In addition to the national public insititutions, the local community represented by the Non-Governmental Organizations (NGOs) were consulted (refer to Table 8-1 and 8-2 in Section 8.1).

2.3 Environmental Standards

The National emission levels for effluent discharges, ambient noise, and ambient air quality are provided in this section.

Wastewater Discharge Targets

The allowable contaminants concentration for wastewater when discharged into the sewage network, sea or surface water are indicated in the MoE decision 8/1 dated 30/1/2001. The table below shows a list of allowable contaminants concentrations.

Table 2-2 The allowable contaminants concentration for wastewater when discharged into different bodies

Contaminants	Surface Water	Sewage Network	Sea Water
pH	6 – 9	6 – 9	6 – 9
BOD mg/l	25	125	25
COD mg/l	125	500	125
temperature Co	30	35	35
Total nitrogen mg/l	30	60	30
Total phosphorus mg/l	10	10	10
Oil and grease mg/l	30	50	30
Mercury mg/l	0.05	0.05	0.05
Total suspended solids mg/l	60	600	60
Total coliform bacteria (Most Probable Number/100 ml)	2000	-	2000

Air Emissions Targets

The maximum allowable limits for outdoor air pollutants are specified in Annex 14 of the MoE Decision No. 52/1 dated 1996. The table below shows the list of allowable criteria pollutants concentrations.

Table 2-3 Maximum allowable limits for outdoor air pollutants

Pollutants	Maximum Limit (µg/m^3)	Exposure duration
Sulphur dioxide (SO_2)	350	1 hr
	120	24 hrs
	80	1 yr

Nitrogen dioxide (NO_2)	200	1 hr
	150	24 hrs
	100	1 yr
Ozone (O_3)	150	1 hr
	100	8 hrs
Carbon monoxide (CO)	30,000	1 hr
	10,000	8 hrs
Total Suspended Particles (TSP)	120	24 hrs
PM_{10}	80	24 hrs
Lead (Pb)	1	1 yr
Benzene	5 ppb	1 yr

Noise Emissions Targets

The expected noise pollution levels should not exceed the values listed in the MoE Decision 52/1 dated 1996. The limited; values are presented in the table below.

Table 2-4 Sound pressure limits according to MoE Decision 52/1, 1996

Phase	Sound Pressure Level dB(A)
Working Location (less than 8 working hrs.)	90
Working Location (requires good speech hearing)	80

Therefore, the maximum national standard of 90 (dB) for occupational noise exposure limits should not exceed an average duration of 8 hours working days. If the limits are higher than the acceptable limits, then the exposure duration should be reduced as mentioned in the table below.

Table 2-5 Noise exposure limits

Sound Pressure Level dB(A)	*Exposure Duration (hrs.)*
95	4
100	2
105	1
110	0.5
115	0.25

Moreover, the following table indicates the Lebanese noise guidelines in different zones and at different periods of the day.

Table 2-6 Lebanese noise guidelines for different zones (MoE 52/1, 1996)

Area classification	Maximum accepted noise level dB(A)		
	Day[1]	Evening[2]	Night[3]
Residential area with few construction sites, activities or on a 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.			

2.4 World Bank Policies and Guidelines

2.4.1 Safeguard Policies

In addition to the Lebanese legislation, two safeguards policies apply to Lebanon Road and Employment Project (1) OP 4.01 Environmental Assessment and OP 4.12 and (2) Involuntary Resettlement.

OP 4.01 Environmental Assessment.

The ESMP for the selected roads in Jbeil should comply with the safeguard policy of the World Bank, specifically, the OP/BP 4.01 regarding Environmental Assessment. The OP 4.01 is triggered as the project could have impacts on the environment due to the rehabilitation of roads infrastructures and associated civil works.

Under the requirements of OP4.01, the proposed project is classified as Category B (impacts are localized, short-term, and reversible and have no severe effects on the environment). Simple and low/moderate cost mitigation measures will be sufficient to restore the potential damage or keep it to the lowest possible) since the environmental impacts are expected to be minimal, during the rehabilitation phase, and can be mitigated via an environmental management plan (i.e. World Bank Environmental Health & Safety Guidelines).

OP 4.12 Involuntary Resettlement.

Despite that OP 4.12 was triggered by this project. In the context of Jbeil and in accordance with site specific plans, no involuntary resettlement or land acquisition will take place. In other words, the project will be implemented primarily within the existing "right of way" there will be no displaced persons by the project activities (this includes local and Syrian refugees).

2.4.2 Consultations and Disclosure Policy

Transparency is essential to building and maintaining communal dialogue, and increasing public awareness about the WBG's development role and mission. It is also critical for enhancing good governance, accountability, and development effectiveness.

Openness promotes engagement with stakeholders, which, in turn, improves the design and implementation of projects and policies, and strengthens development outcomes. In this context, a formal consultation process with the public took place during the preparation of this ESMP for Jbeil Caza. A public participation meeting was was held at the Union of Jbeil Municipalities on Wednesday December 11, 2019 (refer to section 8.1).

Finally, this ESMP will be disclosed on CDR's and concerned municipalities' website.

2.4.3 Useful Guidelines and Manuals

This ESMP was based on Environment Health and Safety (EHS) Guidelines that are referred to in the WB's Environmental. The EHS Guidelines contain the performance levels and measures that are normally acceptable to the WB Group, and that are generally considered to be achievable. The management plan must meet as well the IFC Performance Standard 6 (PC6) in relation to Biodiversity Conservation and Sustainable Management of Living Natural Resources (IFC, 2012). Finally, guidelines from World Bank handbook on roads and environment were used for this ESMP.

2.5 Gap Analysis

The only national Decree 8633 in relation to social and environmental impact assessment does not impose any environmental study for road rehabilitation projects, however, WB guidelines impose conducting an ESMP for such projects.

Moreover, some of the WB's policies and emission limits are more stringent than those of the Lebanese Government. The Lebanese wastewater emission standards are less strict than World Bank standards, but more strict for ambient air quality and similar for noise. In this context, the more strict limits will prevail. Refer to the tables below.

Table 2-7 Comparison of ambient air quality standards between Lebanese and WB standards

Pollutants	Lebanese Standards		WHO Standards	
	Maximum Limit ($\mu g/m^3$)	Exposure duration	Maximum Limit ($\mu g/m^3$)	Exposure duration
Sulfur dioxide (SO_2)	350	1 hr	500	10 mins
	120	24 hrs	20	24 hrs
	80	1 yr	-	-
Nitrogen dioxide (NO_2)	200	1 hr	200	1 hr
	150	24 hrs	-	-
	100	1 yr	40	1 yr
Ozone (O_3)	150	1 hr	-	-
	100	8 hrs	100	8 hrs
Carbon monoxide (CO)	30,000	1 hr	30,000	1 hr
	10,000	8 hrs	10,000	8 hrs
Total Suspended Particles	120	24 hrs	-	-
$PM_{2.5}$	-	-	25	24 hrs
	-	-	10	1 yr
PM_{10}	80	24 hrs	50	24 hrs
Lead (Pb)	1	1 yr	0.5	1 yr
Benzene	5 ppb	1 yr	1.7	1 yr
Benzo[a]Pyrene (BaP)	-	-	0.00012	1 yr
Arsenic (As)	-	-	0.0066	1 yr
Cadmium (Cd)	-	-	0.005	1yr
Nickel (Ni)	-	-	0.025	1 yr

Table 2-8 Comparison of allowable noise level standards between Lebanese and WB standards

region type (receptor)	limit for ambient noise levels dB(A)					
	Day time (7 a.m. - 6 p.m.)		Evening time (6 p.m. - 10 p.m.)		Night time (10 p.m. - 7 a.m.)	
	Lebanese standards	WB standards	Lebanese standards	WB standards	Lebanese standards	WB standards
commercial an administrative area in town centers	55-65	70	50-60	70	45-55	70
residential areas with some	50-60	55	45-55	55	40-50	45

construction sites or along a main road						
urban residential areas	45-55	-	40-50	-	35-45	-
residential suburbs with slight traffic	40-50	55	35-45	55	30-40	45
industrial area	60-70	70	55-65	70	50-60	70
rural residential areas, public gardens and hospitals	35-45	-	30-40	-	25-35	-

Table 2-9 Comparison of allowable wastewater discharge levels standards between Lebanese and WB standards

Parameters/pollutant	**Wastewater Effluent Pollutants Threshold**			
	Lebanese requirements			**WB requirements**
	Surface Water	**Sewage Network**	**Sea Water**	
pH	6 – 9	6 – 9	6 – 9	6 – 9
BOD mg/l	25	125	25	30
COD mg/l	125	500	125	125
temperature Co	30	35	35	-
Total nitrogen mg/l	30	60	30	10
Total phosphorus mg/l	10	10	10	2
Oil and grease mg/l	30	50	30	10
Mercury mg/l	0.05	0.05	0.05	0.01
Total suspended solids mg/l	60	600	60	50
Total coliform bacteria (Most Probable Number/100 ml)	2000	-	2000	400

2.6 International treaties and conventions

The main international treaties and conventions in relation to REP are listed in this section.

Table 2-10 International Treaties and Conventions in relation to REP.

Date	Convention/Agreement	Status	Relevance to Project
1992	United Nations Framework Convention on Climate Change.	Covered by Law No. 359 dated 11th August 1994.	This project must control activities that release green-house gases such as emissions from machineries used (most of which rely on fuel) and excavation activities, among others. (Refer to section 5.3.1.3)
1992	Rio de Janeiro Convention on Biological Diversity.	Covered by Law No. 360 dated 11th August 1994.	This project should abide by this convention to avoid or control activities that may pose a threat on biodiversity at all levels, since improvement of roads sometimes leads, directly or indirectly, to the loss and degradation of natural habitats and biodiversity (refer to section 5.3.1.6).

Table 2-11 Labor Conventions

ILO Convention	Name	Entry into force	Ratification Date	Description	Relevance to Project
ILO no. 29	**Convention Concerning Forced or Compulsory Labor**	01/05/1932	25/06/1977	Its object and purpose are to suppress the use of forced labor in all its forms irrespective of the nature of the work or the sector of activity in which it may be performed. With some exceptions such as military service.	This project should abide by this convention to protect employees from being forced into any type of work activity that they do not want to engage in.
ILO no. 105	**Abolition of Forced Labor Convention**	17/01/1959	25/06/1977	Aims at the elimination of forced labor and cancels certain forms of forced labor still allowed under the Forced Labor Convention of 1930	This project should comply with the guidelines of this convention in order to protect employees from being forced into any type of work activity without their will.
ILO no. 111	**Discrimination (Employment and Occupation) Convention**	15/06/1960	25/06/1977	Enable legislation which prohibits all discrimination and exclusion on any basis including of race/color, sex, religion, political opinion, national or social origin in employment.	This project should abide by this convention to ensure a healthy environment between the employees and between the employer and employees in the

					work place by enforcing equality and respect between them.
ILO no. 122	**Employment Policy Convention**	09/07/1965	25/06/1977	Aim at ensuring that there is freedom of choice of employment and the fullest possible opportunity for each worker to qualify for, and to use his skills and endowments in, a job for which he is well suited, irrespective of race, color, sex, religion, political opinion, national extraction or social origin.	This project should comply with the guidelines of this convention to ensure that employees are given the right opportunities, based on their qualifications, irrespective of their origin, affiliations.
ILO no. 138	**Minimum Age Convention for Admission to Employment and Work**	19/06/1976	25/06/1977	It stipulates that States should progressively raise the minimum age to a level consistent with the fullest physical and mental development of young people. It establishes 15 as the minimum age for work in general and 18 as the minimum age for hazardous work.	This project should abide by this convention in order to abolish the employment of children below the specified minimum age.

3. Description of the Proposed Project

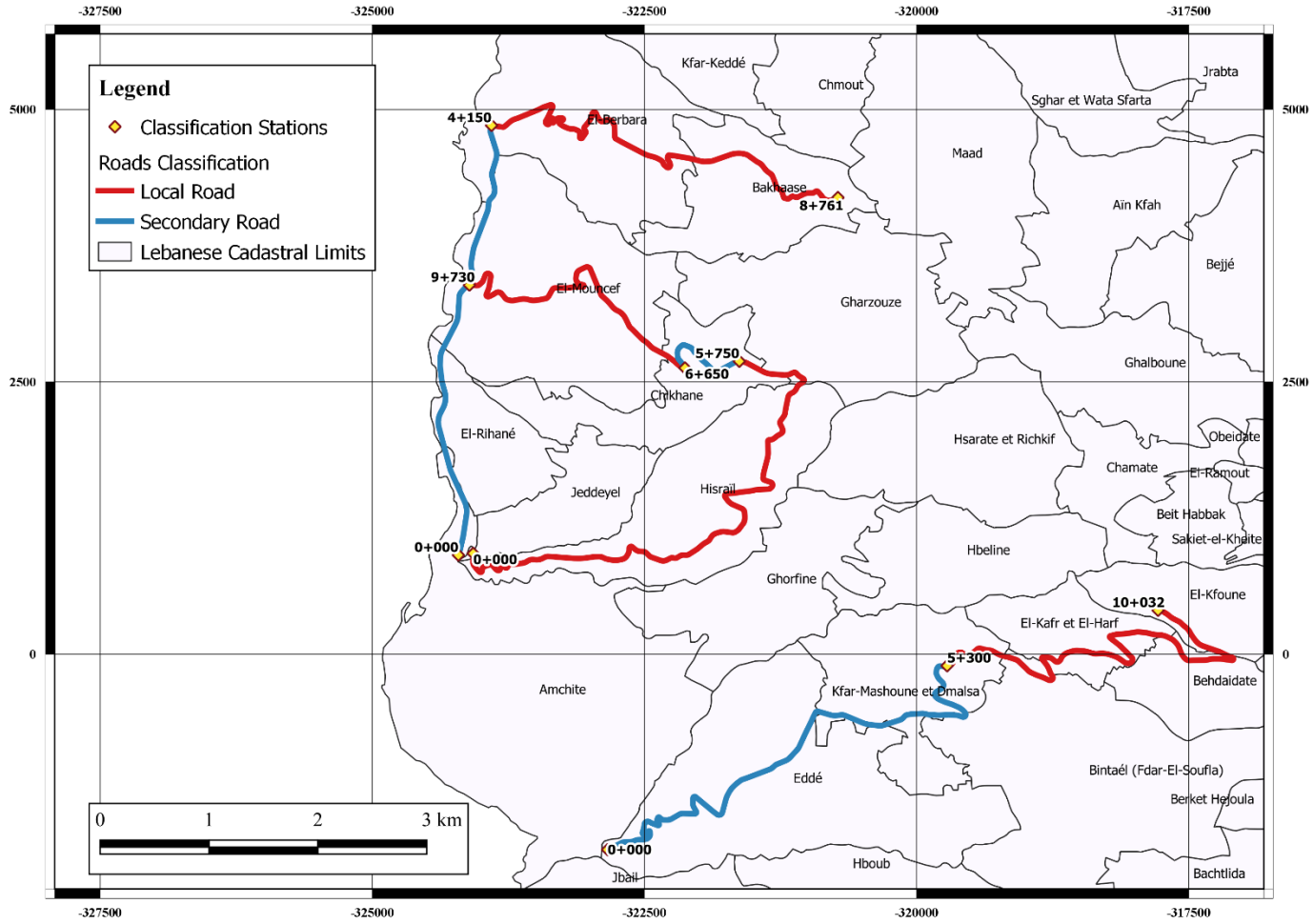
The first element of the REP includes the rehabilitation and maintenance of primary, secondary, and tertiary roads, including road safety and spot improvements. As mentioned before, the subject of this report is the selected roads for rehabilitation in Jbeil Caza.

Two roads with a total width of 28.02 km will be rehabilitated in Jbeil Caza (Table 3-1).

Table 3-1 Roads to be rehabilitated within Jbeil Caza

Caza	Road Code	Cadastral Borders	Length (km)	Road Classification
Jbeil	3	Edde - Kfar-Mashoune et Dmalsa – Bintael - El-Kafr et El-Harf – Behdaidate - El-Kfoune	9.42	Secondary & Local
	4	El-Rihane – Hisrail – Gharzouze – Chikhane – El-Mouncef - Baachta – El-Berbara - Bakhaase	18.60	Secondary & Local

Figure 3-1 Classification of road segments among Jbeil roads



Source: & Dar Al Handasah Nazih Taleb & Partners, process by Geoflint, 2019

3.1 Roads Location and Classification

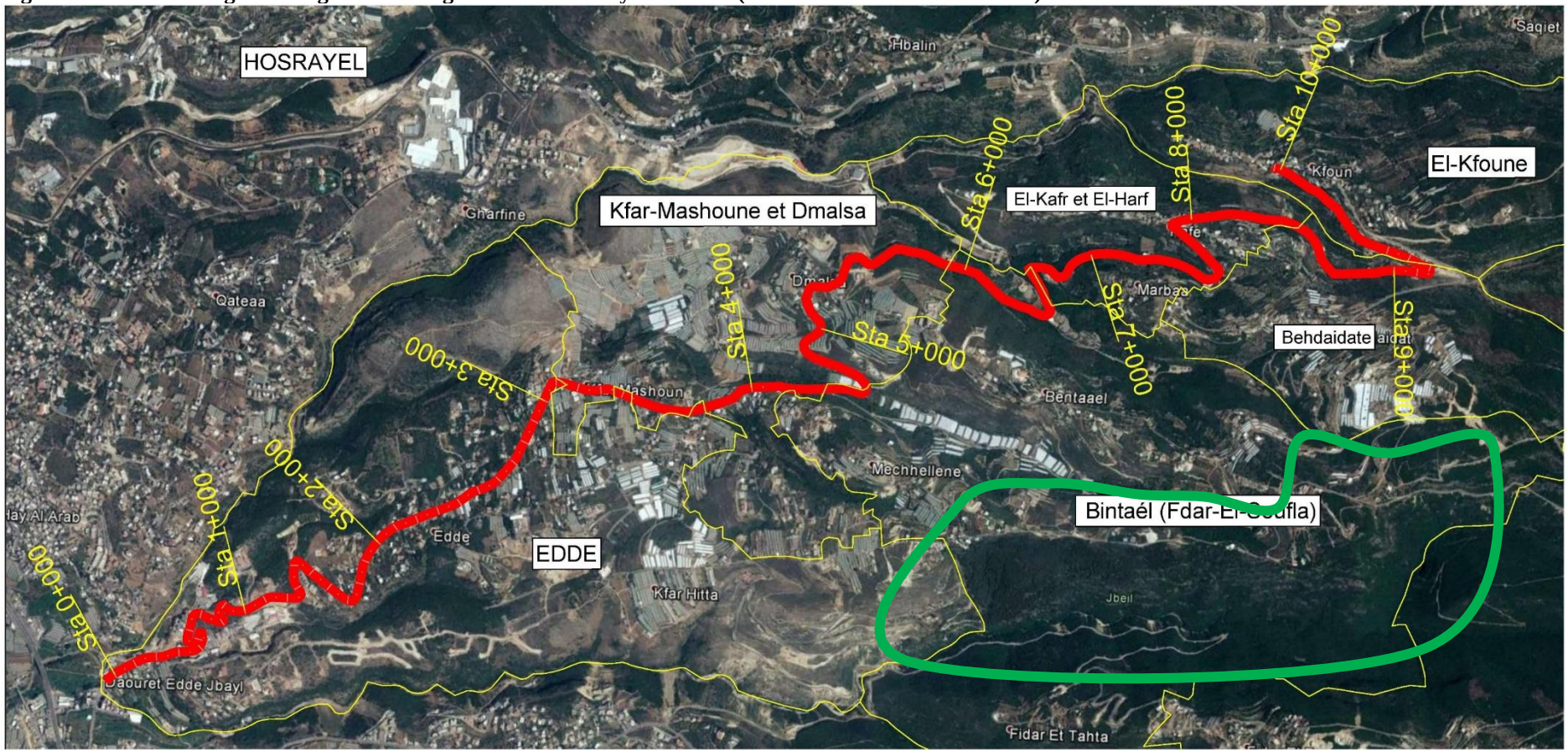
3.1.1 Jbeil R3: (Edde - Kfar-Mashoune et Dmalsa – Bintael - El-Kafr et El-Harf – Behdaidate - El-Kfoune)

Jbeil R3 is located in Jbeil Caza and can be considered as one continuous alignment that has a length of 9.42 km, starting from Edde and ending in El-Kfoune, passing through Kfar-Mashoune et Dmalsa, Bintael, El-Kafr et El-Harf, and Behdaidate. The alignment starts at an elevation of 40 m in Edde village and keeps on ascending to reach a high of 525 m in El-Kfoune. The road passes through urban and rural areas and is classified as part secondary road and part local road, where local roads have a roadway width varying between 4m to 6m, and secondary sections have a width varying between 5m and 8m as shown in Table 3-2. Refer to Figure 3-1 for road classification and Figure 3-2 for road alignment.

Table 3-2American Association of State Highway and Transportation Officials AASHTO 2018

Classification	Width (m)
International Roads	10-14
Local Roads	4-6
Primary Roads	8-10
Primary Roads (highways)	10-14
Secondary Roads	5-8

Figure 3-2 Satellite image showing Jbeil R3 alignment with surveyed stations (Dar Al Handasah Nazih Taleb)



Source: & Dar Al Handasah Nazih Taleb & Partners, 2019

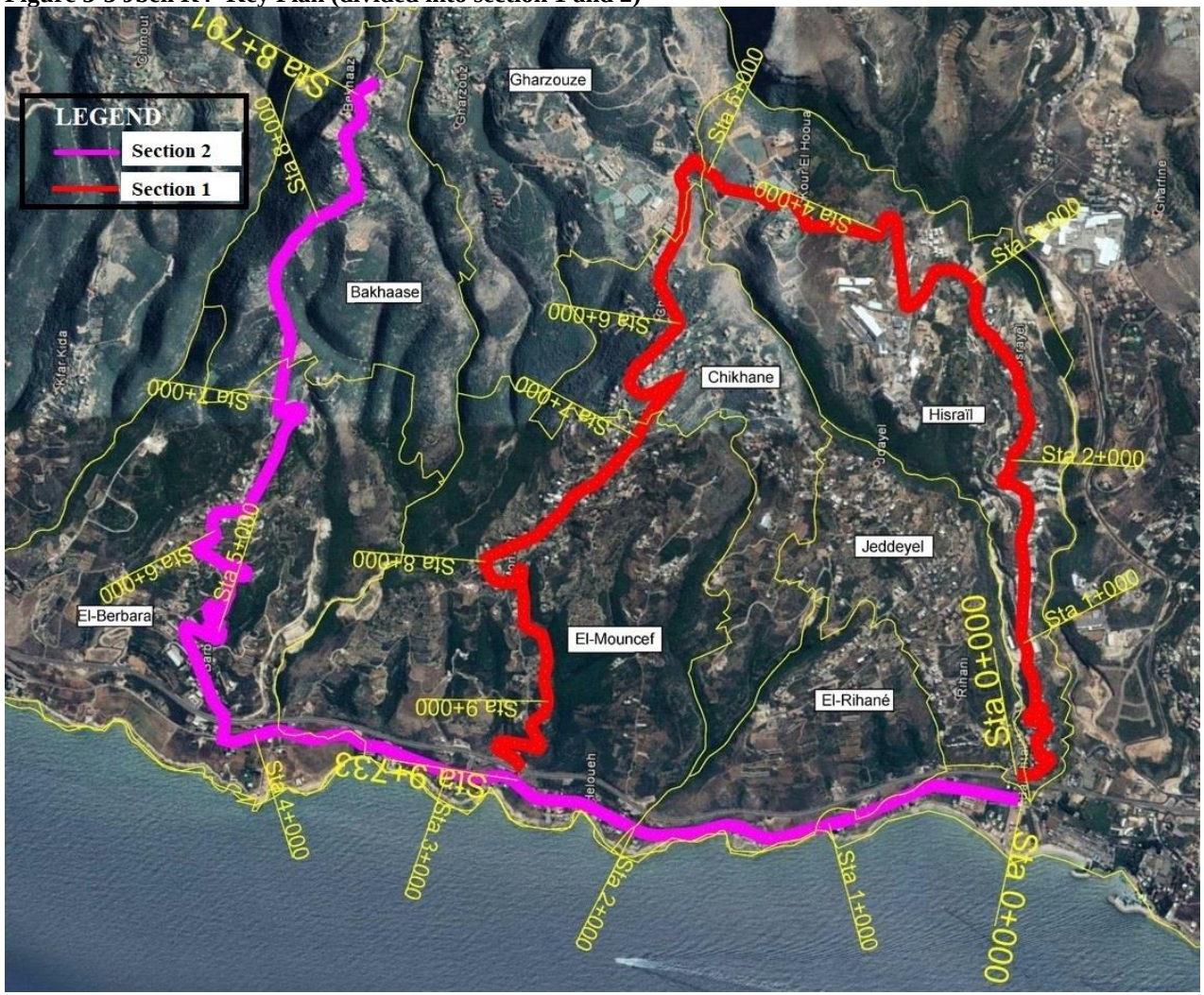
3.1.2 Jbeil R4: (El-Rihane – Hisrail – Gharzouze – Chikhane – El-Mouncef - Baachta – El-Berbara - Bakhaase)

Jbeil R4 is located in Jbeil Caza and includes a coastal section and other branches to the east as shown in Figure 3-3. In total, Jbeil R4 has a length of 18.6 km and connects the villages of El-Rihane – Hisrail – Gharzouze – Chikhane – El-Mouncef - Baachta – El-Berbara - Bakhaase and is classified as a Secondary road for around 5 kilometers and as a Local road for the remaining part.

The road is divided into two sections (Figure 3-3):

- Section 1 starts from the sea side road at El-Rihane and passes through the villages of Hisrail, Gharzouze, Chikhane, and El-Mouncef (Local Road).
- Section 2 starts at Baachta on the seaside, briefly passing through El-Rihane and El-Mouncef, then continues into El-Berbara and ends in Bakhaase

Figure 3-3 Jbeil R4- Key Plan (divided into section 1 and 2)



Source: & Dar Al Handasah Nazih Taleb & Partners, 2019

3.2 Project Activities

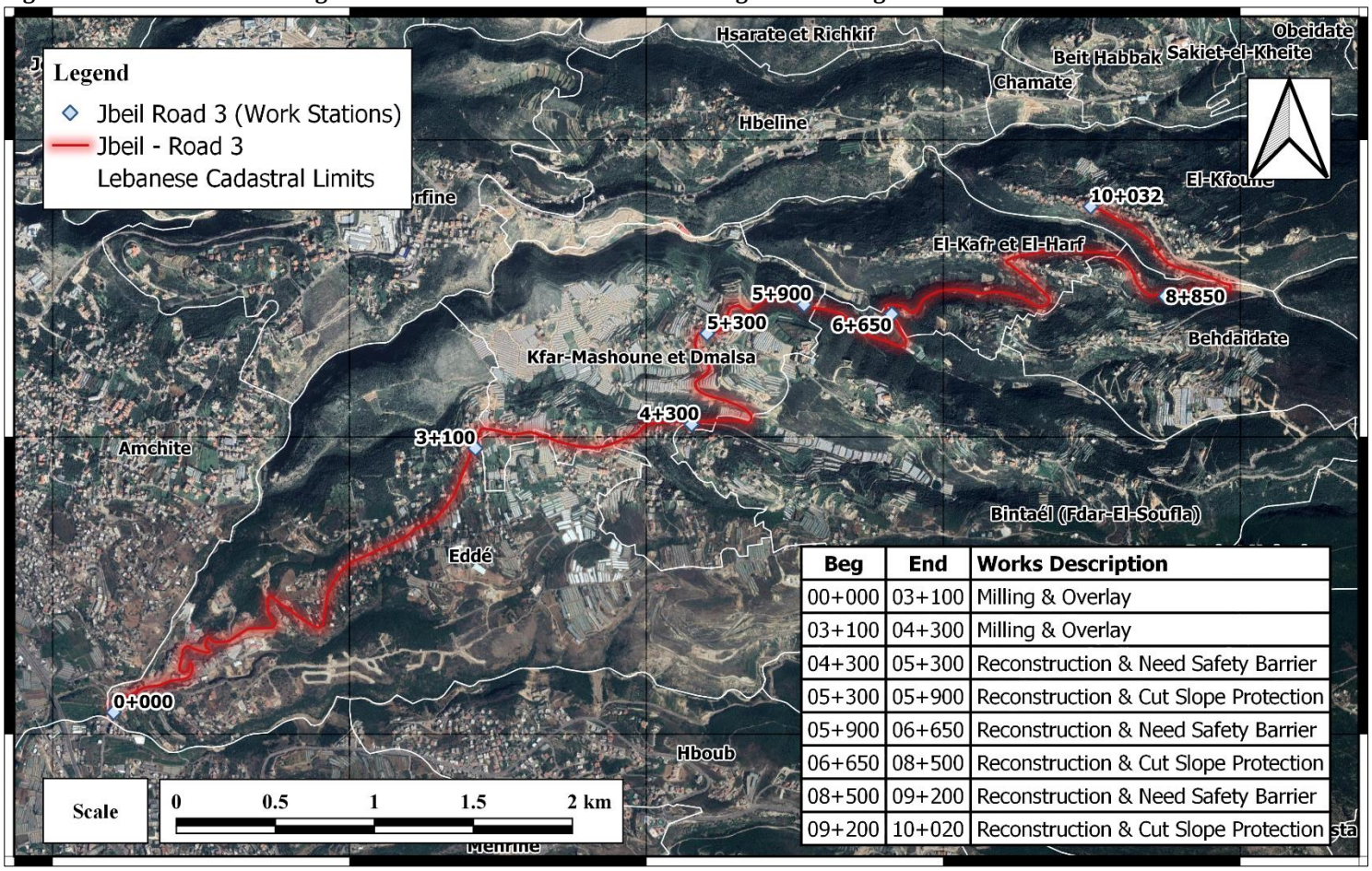
3.2.1 Jbeil R3

The road cross sections and safety conditions assessment are provided in a separate technical report provided by the engineers (Dar Al Handasah Nazih Taleb). In summary, some sections of the road have a narrow width (around 4.5m) which classifies this road as very critical from the safety point of view. The improvement of this section requires widening the existing road from the cut side, however the existing project is limited to road rehabilitation which excludes road widening activities. The road involves rural, urban and secondary and local sections with width ranging between 4 to 6 m and all of the sections have single carriageway. Moreover, a lack of safety barriers is observed along the road especially between station 5+300 and station 10+000. The need to provide new retaining walls, footwalls and slope protection on the cut side of the road is urgent. Further, the absence of signing and marking all over the road is well noticed. Finally, regarding pavement conditions Table 3-3), works will vary between milling and overlay and complete reconstruction of the pavement. Refer to Figure 3-4 for working stations.

Table 3-3 Existing road condition survey (Dar Al Handasah Nazih Taleb & Partners)

Beg	End	Cadaster Location	Road Classification	Urban / Rural	Existing Road Width (m)	Single / Dual Carriageway	Traveled Way Width (m)	Pavement Assessment	Road Safety Assessment
00+000	03+100	Edde	Secondary	Urban	6	Single	6	Milling & Overlay	No work is needed
03+100	04+300	Kfar-Mashoune et Dmalsa	Secondary	Urban	6	Single	6	Milling & Overlay	No work is needed
04+300	05+300	Kfar-Mashoune et Dmalsa	Secondary / Local	Urban	6	Single	6	Reconstruction	Need Safety Barrier
05+300	05+900	Kfar-Mashoune et Dmalsa	Local	Rural	4 - 4.5	Single	4 - 4.5	Reconstruction	& Cut Slope protection
05+900	06+650	Bintael	Local	Rural	4 - 4.5	Single	4 - 4.5	Reconstruction	Need Safety Barrier
06+650	08+500	El-Kafr et El-Harf	Local	Rural	4	Single	4	Reconstruction	Cut Slope protection
08+500	09+200	Behdaidate	Local	Rural	4 - 4.5	Single	4 - 4.5	Reconstruction	Need Safety Barrier
09+200	10+032	El-Kfoune	Local	Rural	4	Single	4	Reconstruction	& Cut Slope protection

Figure 3-4 Work stations along with road rehabilitation activities along Jbeil R3 alignment



Beg	End	Works Description
00+000	03+100	Milling & Overlay
03+100	04+300	Milling & Overlay
04+300	05+300	Reconstruction & Need Safety Barrier
05+300	05+900	Reconstruction & Cut Slope Protection
05+900	06+650	Reconstruction & Need Safety Barrier
06+650	08+500	Reconstruction & Cut Slope Protection
08+500	09+200	Reconstruction & Need Safety Barrier
09+200	10+020	Reconstruction & Cut Slope Protection

Source: Geoflint s.a.r.l. & Dar Al Handasah Nazih Taleb & Partners, 2019

3.2.2 Jbeil R4

The road cross sections and safety conditions assessment are provided in a separate technical report provided by the engineers (Dar Al Handasah Nazih Taleb).

In summary, some sections of the road have a narrow width (around 4.5m) which classifies this road as very critical from the safety point of view. The improvement of this section requires widening the existing road from the cut side, however the existing project is limited to road rehabilitation which excludes road widening activities.

Both road sections involve rural and urban sections with one industrial zone at the beginning of section 1. All of the sections have single carriageway.

Moreover, regarding the safety assessment:

- The sight distance in both horizontal and vertical alignments is not respected at some curves and at some crests in sections 1 and 2.
- Road Intersections need proper safety measurements and signing and marking in order to organize traffic circulation and pedestrian paths.
- A lack of safety barriers is observed along the road. The need to build new retaining walls, footwalls and slope protection on the cut side of the road are obligatory.
- The absence of signing and marking all over the road is well noticed.

Finally, regarding pavement conditions, some of the surveyed stations in both road sections are in good condition and not requiring any works; however, the remaining stations require either pavement milling and overlay or complete reconstruction (refer to Table 3-4, Source: **Dar Al Handasah Nazih Taleb & Partners**

Table 3-5, and Figure 3-5).

Table 3-4 Existing road condition survey – Jbeil R4 section 1

Beginning	End	Cadaster Location	Road Classification	Urban / Rural	Existing Road Width (m)	Single / Dual Carriageway	Traveled Way Width (m)	Cross-Sections Assessment	Pavement Assessment	Road Safety Assessment
0+000	3+000	Hisrail	Local	Urban (Industrial Zone)	6	Single	6	Critical width at some location	Milling & Overlay	Good Condition
3+000	4+300	Hisrail	Local	Rural	4.5 - 5.5	Single	4.5 - 5.5	Critical width < 5m	Reconstruction	Need Safety Barrier
4+300	4+500	Hisrail	Local	Urban	6	Single	6	-	Good Condition	Good Condition
4+500	4+700	Hisrail	Local	Rural	4.5	Single	4.5	Critical width < 4.5m	Good Condition	Good Condition
4+700	4+950	Hisrail	Local	Rural	7	Single	7	-	Good Condition	Good Condition
4+950	5+300	Hisrail	Local	Rural	≈ 4.5 - 5	Single	≈ 4.5 - 5	-	Milling & Overlay	Good Condition
5+300	5+800	Hisrail	Local / Secondary	Rural	≈ 4.5 - 5	Single	≈ 4.5 - 5	Critical width ≈ 4m	Reconstruction	Need Safety Barrier
5+800	6+400	Chikhane	Secondary	Rural	≈ 5	Single	≈ 5	Critical width	Milling & Overlay	Good Condition
6+400	6+850	Chikhane	Secondary / Local	Rural	5.5 - 6	Single	5.5 - 6	Critical width	Good Condition	Good Condition
6+850	9+733	El Mouncef	Local	Rural	5.5 - 6	Single	5.5 - 6	Critical width	Good Condition	Need Safety Barrier at some location

Source: Dar Al Handasah Nazih Taleb & Partners

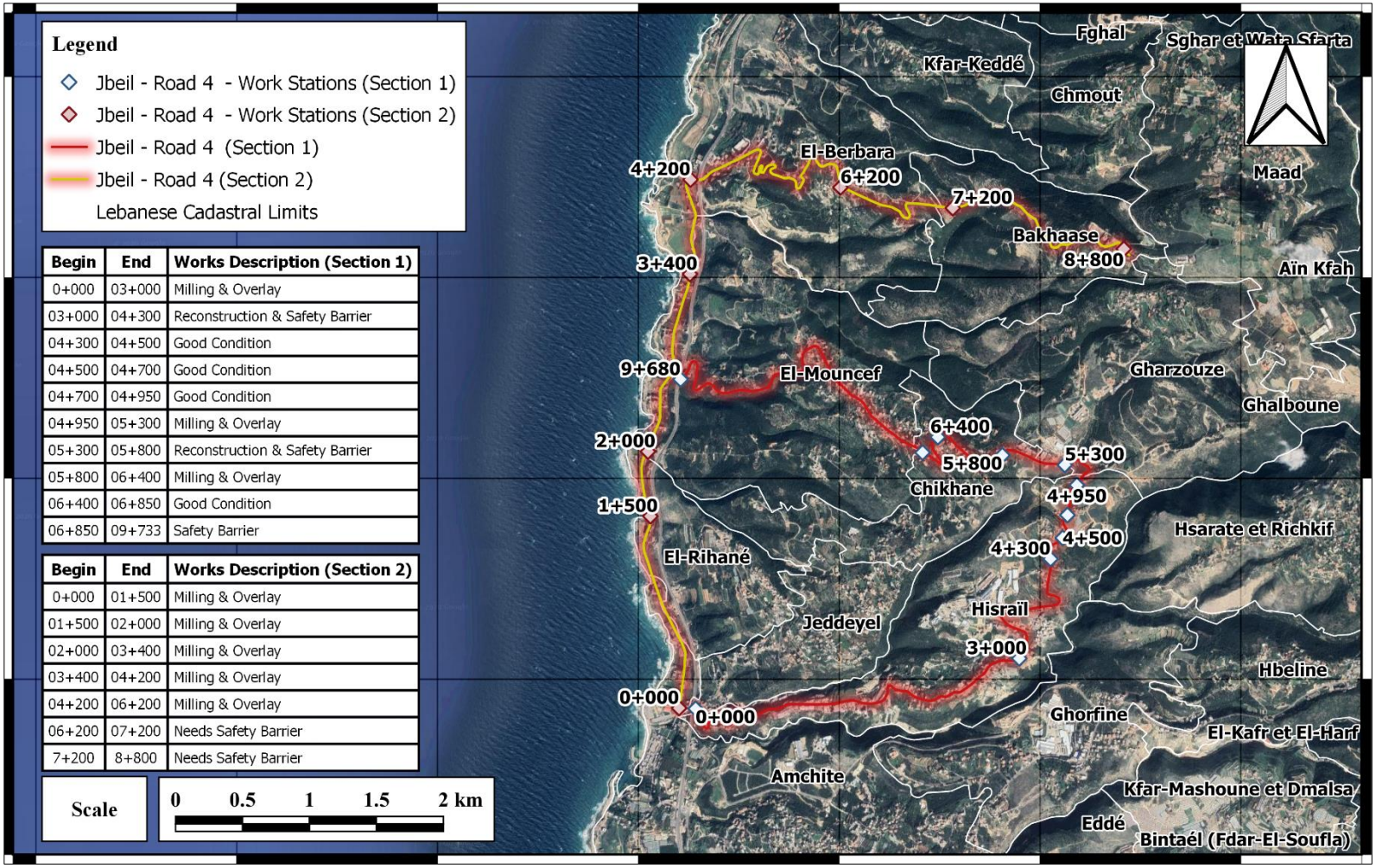
Table 3-5 Existing road condition survey – Jbeil R4 section 2

Beginning	End	Cadaster Location	Road Classification	Urban / Rural	Existing Road Width (m)	Single / Dual Carriageway	Traveled Way Width (m)	Cross-Sections Assessment	Pavement Assessment	Road Safety Assessment
0	1+500	Baachta	Secondary	Urban	7	Single	-	0	Milling & Overlay	Good Condition
1+500	2+000	El-Rihane	Secondary	Urban	7	Single	-	1+500	Milling & Overlay	Good Condition
2+000	3+400	El-Mouncef	Secondary	Urban	≈ 10	Single	-	2+000	Milling & Overlay	Good Condition

3+400	4+200	El-Berbara	Secondary / Local	Urban	≈ 10	Single	-	3+400	Milling & Overlay	Good Condition
4+200	6+200	El-Berbara	Local	Urban	6 - 7	Single	-	4+200	Milling & Overlay	Good Condition
6+200	7+200	Bakhaase	Local	Rural	≈ 5	Single	Need Safety Barrier	6+200	Good Condition	Need Safety Barrier
7+200	8+800	Bakhaase	Local	Rural	≈ 5	Single	Need Safety Barrier	7+200	Reconstruction	Need Safety Barrier

Source: Dar Al Handasah Nazih Taleb & Partners

Figure 3-5 Work stations along with road rehabilitation activities along Jbeil R4 (section 1 & 2) alignment



Begin	End	Works Description (Section 1)
0+000	03+000	Milling & Overlay
03+000	04+300	Reconstruction & Safety Barrier
04+300	04+500	Good Condition
04+500	04+700	Good Condition
04+700	04+950	Good Condition
04+950	05+300	Milling & Overlay
05+300	05+800	Reconstruction & Safety Barrier
05+800	06+400	Milling & Overlay
06+400	06+850	Good Condition
06+850	09+733	Safety Barrier

Begin	End	Works Description (Section 2)
0+000	01+500	Milling & Overlay
01+500	02+000	Milling & Overlay
02+000	03+400	Milling & Overlay
03+400	04+200	Milling & Overlay
04+200	06+200	Milling & Overlay
06+200	07+200	Needs Safety Barrier
7+200	8+800	Needs Safety Barrier

Source: Geoflint s.a.r.l. & Dar Al Handasah Nazih Taleb & Partners, 2019

3.3 Contractor's Equipment and Materials

The contactor's equipment needed for the rehabilitation activities are presented in Table 3-6. The quantities of raw materials to be used during the rehabilitation phase are presented in Table 3-7).

Table 3-6 Equipment to be used

Contractor's Equipment	
Description	No
Excavator	3
Shovel	1
Bob cat	2
Pick-up	2
Truck	3
Water tank	1
Steel roller	2
Conc. transit mixer	1
Asphalt cutter	1
4x4 Vehicles	2
Vehicles	3

Table 3-7 Quantities of main materials to be used during the whole period of the rehabilitation works

Material	**Unit**	**Quantity**
Sub-base and base Course	m^3	16,000
Bituminous Material	m^3	11,600
Reinforced Concrete	m^3	4,010
Clearing and Grubbing	m^2	15,500
Lighting Columns	Number	74
Lighting Brackets	Number	190

3.4 Site Rehabilitation Staffing

It is estimated that rehabilitation works will require between 12 months and 18 months for Jbeil R3 and Jbeil R4 respectively. It is estimated that 55 workers will be involved in the rehabilitation work (Table 3-8).

Table 3-8 Contractor's Personnel

Contractor's Personnel	
Project Manager	1
Civil Engineer	3
Surveyor	1
Foreman	2
Watchman	1
Skilled labor	7
Labor	20
Steel fixer	3
Carpenter	3
Operator	13
Office boy	1
Total	55

3.5 Site Facilities & Infrastructure

The Project site will not include any facilities on-site including 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 a Project Offices. These offices will be used by the Contractor Engineers, technical skilled workers and Supervising Consultants. The flat will be equipped with toilet, 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 the application of proper mitigation measures.

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. Description of the Environment and Social Context

The environmental and social baseline assessment is a key component in any ESMP study. This assessment will grant an initial assessment of all existing phenomena and conditions in the study area and within the area of influence before the implementation of the project. The aim is to identify key environmental and social issues/impacts that need to be mitigated and monitored during project implementation.

4.1 Physical Environment

4.1.1 Topography

Roads under consideration are Jbeil R3 & Jbeil R4, located in Jbeil Caza. Both roads start off at the coast and ascend eastwards into the mountains. The variation in elevation of the vertical alignments are shown in Table 4-1 and the elevation contour lines are shown in Figure A, Figure B, and Figure C in Annex 1).

Table 4-1 Mean sea level elevations of Jbeil R3 and Jbeil R4

Road Name	Altitude approximate range (m)
Jbeil R3	50 - 525
Jbeil R4	15 – 456

Source: Dar Al Handasah Nazih Taleb & Partners, 2019

4.1.2 Geology

The geology of the studied roads was investigated for outcropping formations, subsurface stratigraphy, structure (faults, folds, seismic, etc.), hydrogeology (groundwater and sea water intrusions) and hydrology (surface water).

Jbeil R3

The outcropping lithological formations in and around the study area belong to the Cretaceous and Quaternary geological time periods (Figure D in Annex 1). The road crosses the formations shown in Table 4-2.

Table 4-2 Geological outcrops exposed along Jbeil R3 alignment

Geology	Name	Description
C_4	Sannine Limestone, of Cenemonain age	(C_4); this unit is divided into three subunits: **C_{4a}**: Dolomitic Limestone, within this formation, geodes of different sizes filled or voided can be recorded. Thickness of this unit is about 300 meters. **C_{4b}**: Bluish marl and shale containing crystals of quartz, chert nodules and bands form. Thickness of this unit is about 100 meters. **C_{4c}**: Limestone and dolomitic limestone white to brown in color. Limestone is highly karstified. Thickness of this unit is about 300 meters.
C_5	Maameltain / Ghazir Limestone	Composed of hard crystalline and micritic limestone to dolomitic limestone, creamish white to brown in color, while the weathered color is mainly gray. Limestone / dolomitic limestone are highly karstified and within this formation, geodes of different sizes filled or voided are recorded. This formation is combined with C_{4c} outcrop and can only be distinguished by microfossils.
Q	Quaternary formation, belonging to the Quaternary age	This formation can reach a thickness of 100 m and typically consists of sandy beaches, detrital LS, conglomerates, volcanic coastal or alluvial deposits

Source: Dubertret, (1945)

Jbeil R4

The outcropping lithological formations in and around the study area belong to the Cretaceous geological time period (Figure E in Annex 1). The road crosses the formations shown in Table 4-3.

Table 4-3 Geological outcrops exposed along Jbeil R4 alignment

Geology	Name	Description
C_4	Sannine Limestone, of Cenemonain age	(C_4); this unit is divided into three subunits: **C_{4a}**: Dolomitic Limestone, within this formation, geodes of different sizes filled or voided can be recorded. Thickness of this unit is about 300 meters. **C_{4b}**: Bluish marl and shale containing crystals of quartz, chert nodules and bands form. Thickness of this unit is about 100 meters. **C_{4c}**: Limestone and dolomitic limestone white to brown in color. Limestone is highly karstified. Thickness of this unit is about 300 meters.
C_5	Maameltain / Ghazir Limestone	Composed of hard crystalline and micritic limestone to dolomitic limestone, creamish white to brown in color, while the weathered color is mainly gray. Limestone / dolomitic limestone are highly karstified and within this formation, geodes of different sizes filled or voided are recorded. This formation is combined with C_{4c} outcrop and can only be distinguished by microfossils.

Source: Dubertret, (1945)

4.1.3 Hydrogeology

Geological units can be defined as aquifer or aquiclude in term of storing and transmitting water, and these types depending on the geological environment in which they occur.

Aquifers in the area are the Sannine Limestone (C_4) and Maameltain / Ghazir Limestone (C_5). The limestone formation forms a main part to the study area and is the most important karstic system in the study area characterized by a significant amount of groundwater flowing in channels, faults and fractures. These fractures include solution joints, solution pits, lapiaz, grooves and sinkholes. Cavities in the rocks are often filled with calcite and cave deposits. According to the UNDP (1970) report, the amount of infiltration in this aquifer is approximately 40%. Through the area, the ground water level in this aquifer varies due to topography and rock beds inclination, where the flow of the groundwater is towards the West.

Jbeil R3

In the surrounding area, no lakes or springs were observed. In terms of hydrostratigraphy, the project falls on a karstic limestone formation represented as 2 and 3 in Figure F (in Annex 1) and described in Table 4-4, which is the most important karstic system in the study area. The system is characterized by a significant amount of groundwater flowing in channels, faults and fractures. The transmissivity of these formations is generally high and water table is shallow.

Directly spillage from the rehabilitation works is highly likely to infiltrate groundwater aquifers in the area. Moreover, “Wadi Mouhnane” river can be negatively affected from spillages occurring at the segment of the road that is only 50 m away.

Jbeil R4

The road intersects with “Wadi Baachta” river. In the surrounding area, no lakes or springs were observed. In terms of hydrostratigraphy, the project falls on a karstic limestone formation. represented as 2 and 3 in Figure G (in Annex 1) and described in Table 4-4, which is the most important karstic system in the study area. The system is characterized by a significant amount of groundwater flowing in channels, faults and fractures. The transmissivity of these formations is generally high and water table is shallow.

Directly spillage from the rehabilitation works is highly likely to infiltrate groundwater aquifers in the area. Moreover, “Wadi Baachta” river can be negatively affected from potential spillages (section of road that is only 50 m away from the river).

Finally, for both roads, work stations (where rehabilitation works will take place as shown in (Figure F, Figure G, and Figure H in Annex 1) are overlain along the alignment to be able to identify sensitive subsurface segment of the road.

Table 4-4 Legend of the hydrogeology maps shown in Figure F, Figure G, and Figure H in Annex 1

Hydrogeology Class	Groundwater Sheets	Lithology / Facies	Age	Flows of the sources I/sec.	Probable instantaneous flows of the works I/sec.	Transmissivity m^2/sec
2	In karstic formations Wide and rich water table	Massive limestones and dolomitic limestones with intercal. Marls Thickness: >1000 m.	JURASSIQUE Bathonien-Portlandien	<100 100-1000 >1000	>100	$10^{-2} \leq T \leq 1$ Generally high
3		Limestone regularly bedding Thickness: 800 to 1,000 m.	CRETACE Cénomanien-Turonien	< 100 100-1000 >1000	>100	$10^{-2} \leq T \leq 1$ Generally high
9	Local or discontinuous water table	Sandstone Thickness : 150 à 250 m.	CRETACE Grès de base	<10	<10	$10^{-5} \leq T \leq 10^{-4}$ Poor with weak

Road Name	**Geology Class**			
	2	**3**	**9**	
Jbeil R3	✓	✓		*The roads lie on the following geology classes*
Jbeil R4	✓	✓		

4.1.4 Climate and Meteorology

The climate and meteorological parameters play a vital role in transport and dispersion of pollutants in the atmosphere. Thus, the collection and analysis of meteorological information, including primarily precipitation, ambient temperature, wind direction and speed, are essential data for adequately assessing environmental impacts. The most significant meteorological parameters that influence the direct environmental impacts at the proposed project are: wind due to its ability to carry dust and odors to nearby communities; and precipitation due to its ability to enhance the infiltration of accidental spills and contaminated construction wastewater within the area depending on site operation procedures. Meteorological data are obtained either from the closest available stations and whenever not available satellite data are used and referenced in the text.

Precipitation rates

Jbeil R3

Precipitation in the summer season between the month of June and September are negligible (~ 10 mm) along the road (Figure I in Annex 1). The highest precipitation is recorded in January with an average value of 193 mm and the total annual precipitation is approximately 920 mm.

Jbeil R4

Precipitation in the summer season between the month of June and September are negligible along Jbeil R4 (Figure J in Annex 1). The highest precipitation is recorded in January with an average value of 188.8 mm and the total annual precipitation is 899.6 mm.

Wind records

In general, wind speed and direction vary with time and location depending on season and location. Dominant winds directions on the Lebanese coast are westerly and southern westerly (blowing from west to east and south-west directed to the north-east). Wind speed varies throughout the year and is as low as 2.5 m/s to a high of 4.15 m/s.

Table 4-5 Wind direction, average monthly wind speed, and wind probability recorded at Tripoli station from 6/2005 until 7/2011

Month of year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dominant Wind direction												
Wind probability > = 4 Beaufort (%)	9	13	13	12	8	11	13	16	10	7	6	7
Average Wind speed (m/s)	3.1	3.6	3.6	3.6	3.6	4.15	4.15	4.15	3.6	3.05	2.5	3.05

Source: Tripoli Meteorological Station

Temperature (Land Surface)

Jbeil R3

The hottest month in the area is August (29.7 ºC) and coldest month is January (12.6 ºC). Fluctuations in the temperature values are shown in Figure K (in Annex 1).

Jbeil R4

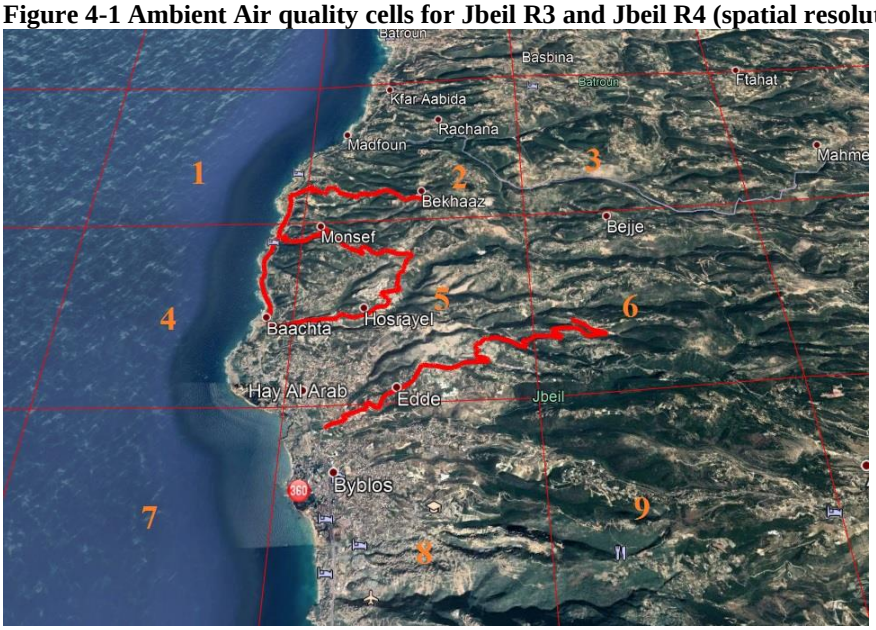
The hottest month in the area is August (30.4 ºC) and coldest month is December (7.88 ºC). Fluctuations in the temperature values are shown in Figure L (in Annex 1).

4.1.5 Air quality and Noise

Air Quality

Air quality is an essential component in assessing social wellbeing and health status of a community. Developing baseline information will help in comparing the impacts of the project relative to the existing conditions. Ambient air quality data was gathered from the UNDP project "Air quality assessment in an East Mediterranean country: the case of Lebanon" which is based at the Ministry of Environment. The UNDP/MoE monitors the criteria pollutants: Particulate Matter (PM), Ozone (O_3), Carbon monoxide (CO), Nitrogen dioxide (NO_2), Sulfur dioxide (SO_2) which are recognized by national and international organizations as good indicators of anthropogenic emissions.

Figure 4-1 Ambient Air quality cells for Jbeil R3 and Jbeil R4 (spatial resolution of 5km)



Source: MoE , 2019

Table 4-6 Ambient air quality in µg/m^3 for Jbeil R3 and Jbeil R4 (roads fall in cells 1, 2, 4, 5, 6, and 8)

Cell ID	NO2	O3	PM10	PM2.5	SO2	CO
1	12.527	90.822	19.630	15.151	11.377	283.038
2	23.535	79.418	21.410	17.356	16.884	463.584
4	15.565	88.181	20.231	15.913	12.288	320.166
5	32.739	71.990	23.646	19.828	18.877	624.143
6	17.446	81.804	19.308	16.440	13.097	357.951
8	38.437	67.698	24.532	20.740	20.514	753.163
Lebanese Ambient Air Quality standards, Decision 52/1	100	100	80	-	80	10,000

NAAQS, EPA	107.6	147.7	150	35	84.6	11,070
Exposure Duration	1 year	8 hours	24 hours	24 hours	1 year	8 hours

Source: MoE , 2019

It is clear in Table 4-6 that ambient air quality concentrations along the two Jbeil roads of all chosen criteria pollutants are compliant with the national guidelines (Decision 52/1) and the international USEPA National Ambient Air Quality Standards (NAAQS) standards.

Noise

Noise levels were measured at each of the road sections using a handheld decibel meter. The meter used is of type Nady DSM-1X Specs having an accuracy of ±1.4 dB with a frequency range of 31.5 to 8,000 Hz.

Measurements were taken based on visual changes in land use and land cover (e.g. changes from residential area to agriculture area), and attention was given to noisy sources such as operating backup generators, rehabilitation activities nearby, among others. Moreover, some measurements were dictated by physical barriers, such as availability of space for parking the survey car. Finally, the schedule of the acoustic survey was planned based on availability of transportation, availability of the handheld decibel meter, availability of staff, and availability of time.

Jbeil R3

Results are reported in Table A (in Annex 1), showing minimum, equivalent continuous A-weighted sound level, maximum, allowable noise level according to Lebanese guidelines, and date and time of acquisition per road section. Measured sound exposure levels varied from as low as 34 decibels (dB) to as high as 81 (dB), where the equivalent continuous noise level (L_{eq}) varied between 47 (dB) and 73 (dB) along the whole road section. The road has an average minimum of 44 (dB), an average maximum of 67 (dB), and an average L_{eq} of 59 (dB).

A study done in 2004 aimed at comparing magnitudes of different sound pressure values (dB) with the noise generated from an ordinary conversation (refer to Table B in Annex 1). In this context, on average, a person maneuvering Jbeil R3 will experience a sound magnitude of 59 (dB), which is approximately equivalent to the sound pressure generated by an ordinary conversation.

Jbeil R4

Similar to the above, measured sound exposure levels (Table C in Annex 1) varied from as low as 35 decibels (dB) to as high as 90 (dB), where the equivalent continuous noise level (L_{eq}) varied between 48 (dB) and 81 (dB) along the whole road section. The road has an average minimum of 49 (dB), an average maximum of 74 (dB), and an average L_{eq} of 63 (dB).

Similarly, with reference to Table B (in Annex 1), a person maneuvering Jbeil R4 will experience a sound magnitude of 63 (dB), which is approximately equivalent to the sound pressure generated by an ordinary conversation.

4.2 Biological Environment and Land use/Land Cover

In the context of ESMP for the road rehabilitation project throughout Lebanon, the direct influence area concerns existing roads. Consequently, a rapid biological assessment has been carried out to draw the ecological profile of the adjacent areas to the concerned road, assess key habitats and flora diversity to identify those species endangered or IUCN-listed that are at added risk from the proposed project. This will serve the management plan and the mitigation measures that will be taken in order to reduce the project's potential impact on the local environment.

The assessment was based on field surveys and generated Land use/Land Cover (LULC) maps for each studied road.

4.2.1 Field Survey

Dates, Methodology, and Limitations

Given the limited timeframe of this study, a single field visit was set for each road (not necessarily during the best period for field visits). The field investigation did not aim for an exhaustive inventory of the biodiversity of the project area but a general overview of present species (mainly flora) and habitats. This general approach allows the identification of the conservation status of the natural habitats.

Moreover, LULC maps were generated for each roads and compiled with site visits observations with respect to key habitats bordering the studied roads.

Walking transects were recognized to obtain an understanding of the vegetation communities in the area and record existing species. Knowing that a single visit is not enough, the study had to consider some species as potentially present. Moreover, it was difficult to perform a complete faunal survey. Thus, information on fauna does not only include the encountered species during the field visit, but also potential species were considered in this assessment. The potentiality of presence of a species was based on: (a) the occurrence of the species habitat; (b) observations of the species near the study area; (c) the fact that the study area is in the distribution range of the species; and (d) related scientific papers.

4.2.2 Evaluation Criteria

Various regulatory and scientific criteria allow organizing in a hierarchy the importance of habitats and species observed in a given area. These criteria include the endemism, rarity, the ecological importance (key species, specialized species, etc.); the biological status (migratory species, breeding species, etc.); and the biological susceptibility.

There is no list of protected species in Lebanon. The protected species are therefore considered based on international conventions for which Lebanon is part of and the IUCN Middle East red list.

In this assessment, the ecological value of species was based on their local ecological importance (distribution of species and degree of endemism (Tohmé and Tohmé, 2014) and IUCN classification).

4.2.3 Results

A. Jbeil R3

Study Area

Project settlement

The studied Jbeil R3 has a length of 9.42 km, starting from Edde and ending in El-Kfoune. The road is settled at an altitude ranging between 50 and 525 meters which makes the studied area covering both the 'Thermo-Mediterranean' and 'EU-Mediterranean, zones (According to CORINE classification, Thermo-Mediterranean zone ranges from 0 to 500 meters, whereas, EU-Mediterranean zone ranges from 500 to 1000 meters, Abi Saleh, 1996). The altitudinal range plays an important role in plant composition.

Situation regarding protected areas

The Bentael Nature Reserve (BNR) is 1Km South of Jbeil R3. This nature reserve was created by the Law No.11 on February 25, 1999. In the absence of a proper Management team, the site is managed by the Bentael Nature Reserve Committee under the supervision of MoE. It is a fragile, rare and typical Mediterranean ecosystem characterized by high levels of biodiversity relatively to its size.

BNR is the first unofficial reserve in Lebanon, covering an area of 110 ha and located 7 km away from Jbeil. Extending between 250 and 800 m of altitude above sea level, this reserve is limited from the North by a public road and private property belonging to the village of Bintael, from the South by the river of Bintael, from the East by the Western boundary of the village of Hjoula and from the West by the villages of Edde and Bintael. It extends over the Thermo-Mediterranean and Eu-Mediterranean vegetation levels. It consists of a mosaic of ecosystems harboring two major forest types: an oak (*Quercus calliprinos)* stand on compact limestone, limited in the valley by the riparian forest of the Bintael River, and a planted pine forest (*Pinus pinea*) on sandstone.

The reserve is home to 350 plant species belonging to 67 different families identified in BNR, including 60 medicinal species, 2 endemic (*Lactuca triquetra* and *Teucrium montbretti ssp. libanoticum*) and various species documented as rare by the UNEP since 1996, of which, *Drimia maritima*. Rich in underground caves and nearly-permanent water basins, BNR is also an important refuge for animals. A preliminary observation showed the presence of foxes, jackals, hedgehogs and various rodents. Finally, BNR gains specific attention for its avifaunal richness as well. The IBA report (A Rocha/SPNL, 2008b) indicates that BNR represents a bottleneck for soaring birds. 41 species of birds have been identified on site during the period 2005-2008 including blackbirds, chickadees, finches, warblers, the wheatear, the Chukar partridge, eagles, pelicans and cranes (A Rocha/SPNL, 2008b).

The current urban sprawl and road paving in the vicinity of the reserve reflect the population growth around BNR, which expose it to increasing anthropogenic pressure. Consequently, losses of landscape values (continuity and functionality) due to the established roads are already raising concerns for the managing authorities of the nature reserve.

Natural Habitats, Flora, and Fauna

Key Habitats

The main habitats that are concerned by the project fall into six types as per field visit and LULC map (map provided by the National Center for Scientific Research (CNRS, 2017) refer to Figure O in Annex 1).

Table 4-7 Key Habitats encountered along Jbeil R3

Habitats types in LULC Map	Field visit observation s
Agricultural Areas	• Olive groves (*Olea europaea)* • Agriculture terraces and 'poly-tunnels' • Cultivated trees, namely eucalyptus trees
Grasslands	• Scrublands and grasslands used for agriculture and forage (Croplands)
Wooded lands	• Mediterranean oak woodland, dominated by the evergreen oak species *Quercus calliprinos*, with a scattering of deciduous oak *Quercus infectoria* and other tree species including Strawberry Tree (*Arbutus sp.)* • Mediterranean maquis that constitute a dynamic hideout for numerous reptiles, mammals, and birds. • Open garrigue vegetation, discontinuous bushy associations of the Mediterranean calcareous plateaus.
Artificial areas	• Urbanized areas, namely residential areas.
Unproductive areas	• Grazing areas
Water bodies	• Riparian thickets are found along the river and include species such as *Platnaus orientalis, Celtis australis* intermixed with *Hedera helix*, and shrubby vegetation including *Rubus hedycarpus.* Riparian habitats are known to be excellent refuge for birds, reptiles, and overall amphibians.

Figure 4-2 Open guarrigue ecosystem bordering Jbeil R3 (located between stations 8+500 and 10+032 shown in Figure O in Annex 1)

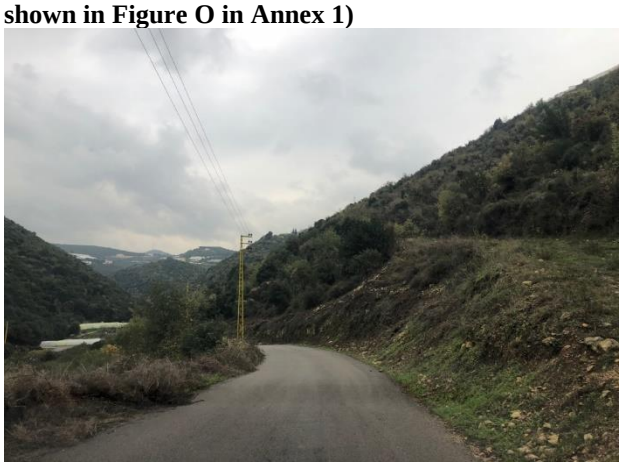
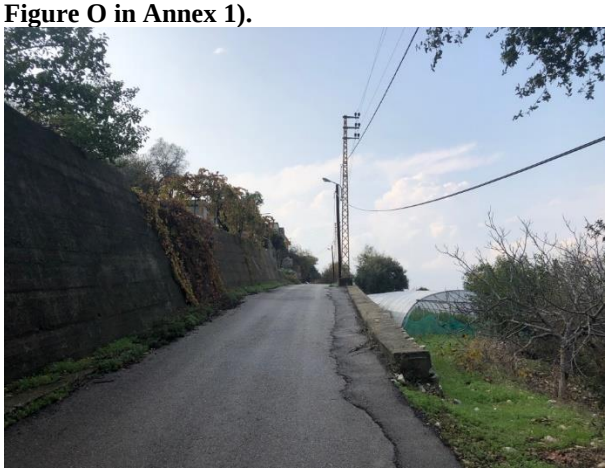


Figure 4-3 Rural, agricultural area (located at station 8+500 shown in Figure O in Annex 1)

Figure 4-4 Olive grove bordering Jbeil R3 (located at station 3+100 shown in Figure O in Annex 1)

Figure 4-5 Agricultural terraces and poly-tunnels bordering Jbeil R3 (located at station 6+650 shown in Figure O in Annex 1).



Flora and Fauna

The road is mainly bordered by open garrigue vegetation, dominated by Kermes Oak (*Quercus calliprinos*) and olive groves (*Olea europaea)*. Trees and shrubs encountered along the road are Umbrella pine (*Pinus pinea*), Aleppo oak (*Quercus infectoria),* Pistachio trees (*Pistachio palestina),* Strawbery trees (*Arbutus andrachne*), Laurel trees (*Laurus nobilis*) et Oleander trees (*Nerium oleander*), Spiny brunet (*Poterium spinosum*), False plumed-thistle (*Onopordum carduiforme Boiss.)* and Throny-broom (*Callicotome villosa)* - no endemic or threatened species have been recorded during the field visit.

Riparian thickets are found along the river and include species such as *Platanus orientalis*, *Celtis australis* intermixed with *Hedera helix*, and shrubby vegetation including *Rubus hedycarpus* and herbaceous species namely *Ficaria grandiflora.*

Regarding the local fauna in the study area, only one lizard was recorded during the field first: *Laudakia stellio stellio* (Hardun), this species is very common in Lebanon, widespread in Lebanon, Syria, Palestine, Egypt, Jordan, Iraq, Turkey and lives in woodlands inhabitant, breed on land in spring and occurs from sea up to 2000 m of altitude. Reptiles believed potential in the studied habitat include the Common Eurasian Lizard that is considered by IUCN (2006) as Critically Endangered (CE), as its area of occupancy is less than 500 km^2, the snake eyed-lizard (*Ophisops elegans*), the Greek tortoise (*Testudo graeca terrestris*), locally, dense populations can be found in open areas connected to woods, and Lebanon lizard *(Lacerta laevis*), a least-concerned species, yet threatened at the local level. The terrestrial tortoise is considered a vulnerable species by IUCN red list however, it is considered in this context a species of moderate ecological value at local scale.

Terrestrial mammals vary widely in ease of observation. Large mammals may simply be counted by direct observation; still, mammals are secretive and nocturnal. Moreover, larger mammals live at low densities, so many are threatened due to the pressures of exploitation. Still, large mammals can be easier than some taxa to survey because they leave characteristic signs. In this context, the study was based on observations of and leftover, traces, sets and literature review (studies that have focused on Bentael Nature Reserve and its surroundings (Tohme et al, 1996 and EcoMed, 2011)) and data from local people.

Species of ecological interest believed potential in the study area include the European Hedgehog (*Erinaceus europaeus concolor)*, the European badger (*Meles meles*), and the squirrel (*Sciurus anomalus syriacus*). These species are rare and threatened at the local level.

Finally, birds believed potential in the studied habitat include the European Honey-buzzards, White Pelicans, and Levant Sparrowhawks. These species were recorded in the study area by SPNL in Autumn 2006. This indicates clearly that BNR does hold some importance as a bottle-neck site for soaring birds at least in Autumn. According to SPNL report, Masked Shrike, Black-eared Wheatear and Western Rock Nuthatch are expected to breed at BNR.

Table 4-8 List of main plant species recorded at the project area

Species	Habitat	Distribution (Tohmé)
Quercus calliprinos	Woodlands and rocky hill slopes	EMR *
Quercus infectoria	Forests, woodlands	EMR
Alnus orientalis	River banks	EMR
Celtis australis	Roadsides and near rivers	Mediterranean
Pinus pinea	Sandstone	Mediterranean
Platanus orientalis	Riparian and lacustrine	Common
Juglans regia	Calcareous ground	Common
Cistus creticus	Woodland, sandstones	Common
Rhamnus alaternus	Woodlands <1000m	Mediterranean
Rubus hedycarpus	Wet Soil common	Common

** Eastern Mediterranean Region (EMR)*

B. Jbeil R4

Study Area

Project settlement

Jbeil R4 has a length of 18.6 km and connects the villages of El-Rihane – Hisrail – Gharzouze – Chikhane – El-Mouncef - Baachta – El-Berbara - Bakhaase and is classified as a Secondary road for around 5 kilometers and as a Local road for the remaining part.

The road is settled at an altitude ranging between 15 m and 456 m which makes the studied area a 'Thermo-Mediterranean' (According to CORINE classification, Thermo-Mediterranean zone ranges from 0 to 500 meters). The altitudinal range plays an important role in plant composition.

Natural habitats and Associated Flora

Section 1 that starts at El-Rihane and passes through the villages of Hisrail, Gharzouze, Chikhane, and El-Mouncef (Local road including a critical section in El-Mouncef). Whereas, Section 2 that starts from Baachta on the seaside passing briefly through El-Rihane and El-Mouncef, then continues into El-Berbara Village and ends in Bakhaase is not of special concern.

In terms of natural habitat and biodiversity, Section one of the road can be divided into three segments. The first segment covers the lower points of the road up to El-Mouncef where the ecosystem (i.e surrounding of the road) is already degraded as the area is characterized by artificial and industrial zones (refer to Figure 4-7). Whereas, the segment of the road that crosses

the village of El-Mouncef is surrounded by a Valley covered with dense woodland that needs special attention during the rehabilitation work (Figure 4-9).

Finally, the road that crosses El-Rihane – Hisrail – Gharzouze - Chikhane is namely surrounded by open garrigue vegetation, discontinuous bushy associations of the Mediterranean calcareous plateaus, dominated by Kermes Oak (*Quercus calliprinos*) and dwarf-shrubs, Spiny Burnet (*Sarcopoterium spinosus*); agricultural areas; and residential rural areas where the natural habitat is already altered by human activities. More precisely, this section of the road is namely bordered by cultivated lands, grazing areas, olive groves, Calabrian pine (*Pinus brutia*), Evergreen cyppress (*Cupressus sempervirens*), Umbrella pine (*Pinus pinea*), and Tanner's sumac (*Rhus coriara*).

The main habitats that are concerned by the project for Jbeil R4 fall into six types as per field visit and LULC map (map provided by the National Center for Scientific Research (CNRS, 2017 refer to Figure P and Figure Q in Annex 1).

Table 4-9 Key Habitats encountered along the Jbeil R4

Habitats types in LULC Map	Field visit observations
Agricultural Areas	• Agricultural terraces
Grasslands	• Scrublands and grasslands
Wooded lands	• Open woodland with some scrubby vegetation • Dense woodland dominated by Kermes Oak (*Quercus calliprinos*) – El-Mouncef area
Artificial areas	Urbanized areas including residential and industrial areas with cultivated trees namely eucalyptus trees.
Unproductive areas	Grazing areas and fallow lands.
Water bodies	Riparian thickets are found along the river and include species such as *Platanus orientalis* and *Hedera helix.*

Fauna

Habitat loss is the most significant threats to wildlife in Lebanon and a driving force behind the extinction of species. Most of Habitat loss is due to the expansion of human activities into natural areas. In this context, a fauna assessment is essential before developing new projects. The aim is to assess the environmental sensitivity of the site in order to prevent or reduce the potential damage to the existing habitat and wildlife. A rapid fauna assessment was conducted. However, fauna survey is not realistic in a single field campaign. Therefore, unfortunately, the study will only list the potential mammals that may be encountered at the project site. No listing of arthropods, amphibians, reptiles and birds was placed in this study despite their important role in maintaining a healthy ecosystem.

Dense wooded lands that were noticed along Jbeil R4 potentially harbor a large variety of fauna including the White-breasted hedgehog *(Erinaceus concolor);* Red fox *(Vulpes vulpe palaestina);* Stone Marten *(Martes foina syriaca) and;* Palastine Mole-rat *(Spalax ehrenbergi).* All these species are categorized as being of least concern in the IUCN list of threatened species.

Figure 4-6 First station of section 1-Jbeil R4

Figure 4-7 Industrial area bordering the road, Section 1 (stations 0+000 & 3+000-Jbeil R4)

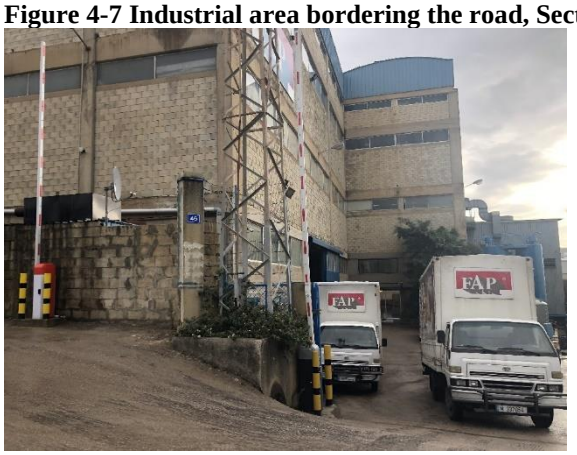


Figure 4-8 Surrounding ecosystem at Kour el Hawa (agricultural terraces)

Figure 4-9 End of El-Mouncef (rich valley) – Section 1 ((between stations 6+850 and 9+680), Jbeil R4

Figure 4-10 First station of section 2 of Jbeil R4 (coastal section of the road station 0+000, Baachta)

4.2.4 Summary of Results

In summary, the assessment showed that Jbeil R4 passes through a critical natural habitat in El-Mouncef area (dense woodland valley) that needs special attention during the rehabilitation

phase. Moreover, regarding Jbeil R3, special attention must take place when the road is close to Bentael Nature Reserve (BNR). BNR is 1Km South of Jbeil R3.

The surrounding natural habitats along Jbeil R3 are under clear anthropogenic influences. The alignement is mainly bordered by open garrigue vegetation, dominated by Kermes Oak (*Quercus calliprinos*), agricultural terraces, and olive groves (*Olea europaea)*.

Regarding Jbeil R4, in terms of natural habitat and biodiversity, section one of the road can be divided into three segments. The first segment covers the lower points of the road up to El-Mouncef where the ecosystem (i.e surrounding of the road) is already degraded as the area is characterized by artificial and industrial zones (refer to Figure 4-7, between station 0+000 and station 3+000). Whereas, the segment of the road that crosses the village of El-Mouncef is surrounded by a Valley covered with dense woodland that needs special attention during the rehabilitation work (Figure 4-9, between station 6+850 and station 9+680). Finally, the road that crosses El-Rihane – Hisrail – Gharzouze - Chikhane is namely surrounded by open garrigue vegetation, discontinuous bushy associations of the Mediterranean calcareous plateaus, dominated by Kermes Oak (*Quercus calliprinos*) and dwarf-shrubs, Spiny Burnet (*Sarcopoterium spinosus*); agricultural areas; and residential rural areas where the natural habitat is already altered by human activities.

When Jbeil R3 and Jbeil R4 are very close to rivers, particular biotopes (riparian vegetation) were noted. Any contamination of soil and water can have severe irreversible impacts on the local biodiversity. The project should not affect the concerned riparian communities and the surrounding vegetation and animal communities (birds of passage or resident amphibians and reptiles) that could be of ecological significance

4.3 Socio-Economic Condition

This section describes the social and economic conditions of Jbeil Caza where Jbeil R3 and Jbeil R4 will be rehabilitated.

4.3.1 Relevant Caza Background

The district of Jbeil is one out of the 26 districts of Lebanon, occupying 430 km^2 of surface area. According to the latest national report (MoPH, 2016), Jbeil Caza has a population of 92,016 in year 2016 excluding the Syrian refugees (Palestinians camps are absent), where the majority of the population (~65 %) belong to the active group age, ranging between 15 and 65 years old.

Jbeil is home to 3.2 % of total number of industries in Lebanon, it is characterized by an unemployment rate of 5 % (refer to Table D in Annex 1).

According to OCHA (2016), approximately 69,933 of Lebanese are above the poverty line in Jbeil, whereas, the deprived Lebanese in Jbeil are approximately 10,728 persons.

Approximately 8,377 Syrian refugees are registered in Jbeil. 64.8% of Syrian refugees' household are below poverty line in Jbeil (VASYR 2017, UMHCR). However, it is important to mention that no refugee camps were detected at the areas bordering Jbeil R3 and Jbeil R4.

In regards of infrastructure, the Italian Agency for Development Cooperation launched the funding of a water supply and wastewater treatment program in Jbeil Caza in year 2009. The project is composed of a complete water supply system and a wastewater treatment system with a treatment plant to be located in Qartaba, expected to serve the whole Jbeil Caza population. In the time being, domestic wastewater is either treated by private wastewater treatment plants (WWTPs), or collected in septic tanks and discharged into the Mediterranean Sea, similar management techniques are applied for industrial wastewater.

In terms of solid waste, Hbaline open dump has been the main management tool in the Caza over many years, along with open burning. However, recently the burning of waste was prohibited by Jbeil municipality and other tools are being investigated. Byblos municipality constructed a new waste recycling facility, which has a capacity of 10 t/d of pre-sorted recyclables, other waste streams are mostly diverted to Hbaline dumpsite.

4.3.2 Road Sensitive Receptors

Sensitive receptors were collected during the field visits and previous surveys for similar projects. The data was analyzed using ArcGIS. Categories considered as sensitive receptors during road rehabilitation are schools, churches, hospitals, mosques and closest residential buildings (refer to Figure R, Figure S, and Figure Tin Annex ١).

The main sensitive receptors encountered along the Jbeil roads are presented as follows:

Jbeil R3:

- Residential agglomerations in addition to nearby schools and places of worship from station 0+000 to station 5+300 surrounded (urban settlements)
- Dispersed residential buildings in addition to schools and places of worship from station 5+300 to 10+032 (rural settlements)
- The highly affected churches along Jbeil R3 are NaamatAlla Church (0 m), Mar Nicolas Church Remains (4 m away), Mar Estaphan Church Remains (4 m away) and Mar Tadros Church (6 m away)
- Agricultural areas mostly located between the stations [3+100 - 5+300] and [6+650 - 8+500] (refer to Figure O in Annex 1 for the exact locations of the agricultural lands)

Jbeil R4 section 1:

- Residential agglomerations mainly from station 0+000 to station 3+000 and from station 4+300 to station 4+500 (urban settlements)
- Dispersed residential buildings from station 5+300 to station 6+400 and the straight segment after station 6+850 (rural settlements)
- Nearby sensitive receptors mainly schools and places of worship, in specific, from station 5+800 to 6+400, from station 4+300 to station 4+500
- Agricultural areas mainly between stations [3+000 - 4+300], [4+500 - 4+700], [4+950 -5+300], [6+400 – 6+800] and last segment of the road reaching to station 9+730

Jbeil R4 section 2:

- Scattered residential areas mainly around station 0+000 and from station 2+000 to station 6+200 (urban settlements)
- Places of worship are not numerous along this alignment
- Agricultural areas surround the road mainly from station 6+200 to station 8+800 (rural settlements)

4.3.3 Traffic Survey

For the purpose of road rehabilitation; which requires pavement analysis and design, a traffic survey was conducted by Dar Al Handasah Nazih Taleb & Partners. The survey focused on the gathering of baseline data for the existing road conditions, and the Average Daily Traffic (ADT) was the main parameter collected. In addition, the types of vehicles maneuvering the two roads were also examined.

The data collection program consists of automatic classified counts at 17 Stations in all the three Caza, Metn, Kesrouane and Jbeil with wide range of traffic count conditions and road characteristics. All long road segments (more than 10 km) required more than one count station one at the beginning and at the end as well an intermediate location where this road link intersect with a higher rank road (example: Secondary intersecting with Primary) while for short road segments one classified count is carried out at the middle of the road link, which is defined as follow:

- For Primary roads, a link is defined as the road section between two consecutive intersections with primary or secondary roads.
- For secondary roads, a link is defined as the road section between two consecutive intersections with primary, secondary or tertiary roads.

The distribution of the ATC Stations throughout Jbeil roads 3 and 4 are shown in Figure U (in Annex 1).

Jbeil R3

Two ATC stations were installed along Jbeil R3 in order to determine level of traffic. The ADT counts showed a minimum of 107, a maximum of 2,613, and an average of 1,240 vehicles per day (refer to Table G in Annex 1). Moreover, the type and classification of vehicles were determined, where it was revealed that a passenger car was the main vehicle type (91.6 %) maneuvering the road, followed by a four-tire truck (6.8 %) (refer to Table H in Annex 1).

Jbeil R4

Three ATC stations were installed along Jbeil R4 in order to determine level of traffic. The ADT counts showed a minimum of 323, a maximum of 1,375, and an average of 1,030 vehicles per day (refer to Table I in Annex 1). Moreover, the type and classification of vehicles were determined, where it was revealed that a passenger car was the main vehicle type (88%) maneuvering the road, followed by a motorcycle (4.4 %) (refer to Table J in Annex 1).

Summary of Results:

The ADT values were determined in order obtain an idea about the level of traffic in each of Jbeil caza roads. It is expected that the local road sections of Jbeil roads 3 & 4 witness lower traffic volume when compared to the secondary sections that are located closer to the coast. Traffic volume at local sections reaches a low of 107 and 323 vehicles per day for Jbeil road 3 and 4 respectively. Moreover, given that Jbeil road 3 secondary road section is located in a

highly urbanized commercial/residential area, it witness higher traffic volume (2,613 veh/day) when compared to the rather quiet secondary coastal road section of Jbeil road 4 (1,375 veh/day).

Finally, it was shown that passenger cars were the main mode of transportation used, followed by either motorcycles or four-tire trucks.

5. Potential Environmental and Social Impacts

The expected social and environmental impacts were assessed during both the rehabilitation and operation phases of the project. Regarding the operation phase, this assessment entails the the "**Defects Liability Period'** during which the Contractor is responsible for maintenance activities.

Regarding the social assessment, potential beneficiaries of the project and the adversely affected groups, including Lebanese and Syrians involved in the project and/or living in the surrounding communities of Jbeil R3 and Jbeil R4 were considered in this assessment.

Moreover, concerning refugee camps, during the site visits to Jbeil R3 and R4, refugee camps of vulnerable groups such as Syrians were not observed. As such, impacts on socio economic conditions of vulnerable groups were assessed as part of the impacts on the surrounding residential areas, as in this case displaced Syrians are not living in specific camps, and thus are considered as part of the local communities of Jbeil. Moreover, it is important to mention that rehabilitation and maintenance works in Jbeil R3 and R4 will not require land acquisition, therefore, vulnerable groups along the roads to be rehabilitated in Jbeil Caza will not be relocated.

5.1 Assessment Methodology

The assessment followed the Lebanese MoE grading methodology stated in Decree 260/1, dated 2015. The impact grading methodology is explained in this section.

This approach was adopted in order to address the several sources of impacts from the project's rehabilitation and operational phases. The stages of the evaluation process are the following:

1. Identification of project-related activities (sources) and environmental aspects.
2. Identification of potential impacts to the environment (physical, biological, human, cultural).
3. Evaluation and assessment of the related unmitigated impact significance.

Impacts are first classified as shown the table below:

Table 5-1 Classification of impacts

Matrix	Classification	Criteria
N (Nature)	**P** (Positive)	• The proposed activity offers benefits for the overall project
	N (Negative)	• Impacts having minimal to major negative influence
	D (Direct)	• Impact arising directly from the project activities
	I (Indirect)	• Impacts arising from activities not directly related to the project development
M (Magnitude)	**L** (Low)	• High potential to mitigate negative impacts on the physical, biological or human environment to the level of insignificant effects.

Matrix	Classification	Criteria
		• Disturbance of degraded areas with little conservation value. Minor changes in species occurrence or variety. • Simple mitigation measures may be needed to minimize impacts
	M (Moderate)	• Medium range (beyond site boundary but restricted to local area). • Medium-term (reversible over time, duration of operational phase). • Potential to mitigate negative impacts on physical, biological or human environment. However, the implementation of mitigation measures may still not prevent some negative effects. • Destruction/Disturbance of areas with potential conservation value. Complete changes in species occurrence or variety. • Mitigation measures will help minimize impacts
	H (High)	• Disturbance to areas of high conservation value. Destruction of rare or endangered species. • Mitigation is required. • Largely irreversible impacts on the physical, biological or human environment. • Has a massive impact on the surrounding livelihood. • Potentially irreparable damage to a site of social and/or cultural importance
E (Extent)	**L** (Local)	• Limited to the project area • Locally occurring impact within the locality of the proposed project
	G (Global)	• Extend beyond the local area • National impact affecting resources on a national scale
T (Timing)	**S** (Short-term)	• Activities and their related impacts are characterized by a short duration of effect
	M (Medium-term)	• Activities and their related impacts are characterized by a medium duration of effect
	L (Long-term)	• Activities and their related impacts are characterized by a long duration of effect
D (Duration)	**C** (Construction)	• Impacts arise during the construction phase of the proposed project
	O (Operation)	• Impacts arise during the operational phase of the project
R (Reversibility)	**R** (Reversible)	• Impacts may be reversible, or able to be rehabilitated upon the decommissioning of the proposed project
	I (Irreversible)	• Impacts may not be reversible, or able to be rehabilitated upon the decommissioning of the proposed project
L (Likelihood of occurrence)	**L** (Low)	• The classified impact is unlikely to occur under normal operating conditions
	M (Medium)	• The classified impact may possibly occur
	H (High)	• The classified impact is unlikely to occur under normal operating conditions

Matrix	Classification	Criteria
S (Significance)	**L** (Low)	• Results in no substantial adverse change to existing environmental conditions
	M (Medium)	• Substantial adverse change to existing environmental conditions • Can be mitigated to less-than-significant levels by implementation of proposed potentially feasible mitigation measures or by the selection of an environmentally superior project alternative
	H (High)	• Substantial adverse change to existing environmental conditions • Cannot be fully mitigated by implementation of all feasible mitigation measures

The environmental significance matrix adopted is based on the well-known "weighted scoring" or "weighing and scoring" method used as a tool in various decision analysis applications. In this method, the following steps takes place:

1. Attributes relevant to the project are chosen
2. Weights or numerical values are assigned to each attribute depending on its importance (values should be based on objective data or expert opinion to exclude subjectivity during the process).
3. Scores are allocated to each option to reflect its status with respect to each attribute

The final result is a single weighted score for each option, which is used to quantify its overall performance/significance. As such, the adopted matrix is designed to allow subjective conclusions to be numerically recorded or quantified, therefore providing at the same time an impact evaluation and quantitative record to revert to in the future:

Table 5-2 Significance Impact Matrix

	Magnitude x Extent x Duration								
Likelihood x Frequency	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	2	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**
	3	**6**	**9**	**12**	**15**	**18**	**21**	**24**	**27**
	4	**8**	**12**	**16**	**20**	**24**	**28**	**32**	**36**
	5	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**
	6	**12**	**18**	**24**	**30**	**36**	**42**	**48**	**54**

***Yellow**: Negligible / **Green**: Low significance / **Blue**: Medium significance / **Red**: High significance*

5.2 Positive Impacts during Rehabilitation

5.2.1 Positive Social Impacts

Positive socio-economic impacts, during rehabilitation, is creating direct and indirect short term jobs for Lebanese and Syrians living in the community around the selected roads. In turn, local economic development and livelihood opportunities will be enhanced. Direct job opportunities at the selected road rehabilitation sites will be offered to poor communities and vulnerable groups (low skilled Lebanese and Syrians) in order to enhance their socio-economic conditions.

The roads rehabilitation project will also create indirect jobs for low skilled Lebanese and Syrians in supporting industries and services (such as production of construction materials at local shops and factories, transportation of materials, maintenance of equipment).

Moreover, the road rehabilitation project will also enhance the local economic development of the surrounding community in the following three cases:

- Knowing that the Contractor will not perform vehicle and equipment repair onsite, preferably maintenance activities will be done in repair shops surrounding the Jbeil R3 and R4.
- The Contractor will rent a fenced land in the surrounding area of Jbeil R3 and R4 to be used for parking purposes.
- The Contractor might rent an apartment for the low skilled workers (in case hiring of low skilled workers from the surrounding community is not possible) form the nearby community.

Further, Lebanese and Syrian workers' skills and experience in road rehabilitation and maintenance will be strengthened, as a result of the learning and training programs of the job onsite.

5.3 Potential Negative Impacts during Rehabilitation

5.3.1 Potential Negative Environmental Impacts

Negative impacts that may derive from the project rehabilitation phase are namely adverse impacts on the local environment. This section elaborates the potential impacts on each environmental component.

5.3.1.1. Impacts on Water Quality

The outcropping lithological formations in and around the study areas belong to the Cretaceous and Quaternary geological time periods. Jbeil R3 and R4 mainly cross the Sannine Limestone, of Cenemonain age unit (C_4) and Maameltain / Ghazir Limestone, Turonian unit (C_5) formations.

The study area is characterized by the presence of main aquifer within the various formations. The roads fall on a karstic limestone formation. The system is characterized by a significant amount of groundwater flowing in channels, faults, and fractures. The transmissivity of these formations is generally high and the water table is shallow.

In addition, Jbeil R3 and R4 are in close proximity to the Wadi Mouhnane River and Wadi Baachta River respectively from the south or south east section of the roads. The distance between Jbeil R3 and Wadi Mouhnane River along the whole segment ranges from 50 m to 1,230 m. Regarding Jbeil R4, Wadi Baachta River is far from Jbeil R4 by a distance ranging from 50 m to 550 m. Thus, direct pollution of the surrounding rivers is anticipated, if proper management practices are not adopted.

Any accidental spillage of wastewater (from the portacabin toilet), chemicals, or toxic substances onto open ground can easily infiltrate the karstic limestone and is highly likely to pollute water present in the subsurface. Moreover, any dumping of solid waste or discharge of wastewater into the streams and winter channels will lead to adverse impacts downstream of "Wadi Mouhnane River" and "Wadi Baachta River" rivers.

The major impacts on groundwater and surface water during the rehabilitation works can be associated with the following activities:

- During installation of concrete barriers, on-site concrete pouring may leach and get deposited in nearby streams and water bodies.
- During paving of road, any accidental deposition of toxic asphalt substances into nearby watercourses can cause pollution of surface water (specifically the nearby rivers Wadi Mouhnane and Wadi Baachta) and underground aquifers since most of the road alignment falls on a karst limestone acquifers (Figure F, Figure G, and Figure H in Annex 1).
- During installation of road markings, spillage of chemical paint substances can also pollute open channel watercourses.
- Excavations, drilling, and milling produce substantial amounts of dust and scattered pavement materials. Dust can enter water courses when it is mixed and directed by rain or it can be deposited naturally. This can cause cloudiness and increased water turbidity.
- The portacabin toilet is a source of wastewater generation. Improper management of the generated waste will pollute nearby surface water bodies, streams and underground aquifers since most of the road alignment falls on a karst limestone aquifers. This means that transmissivity is high in the project area, thus, proper management practices should be implemented to avoid contamination of surface and groundwater resources.
- Contaminated stormwater runoff along with sediment transport from the rehabilitation site into the surrounding rivers is possible. Storm water runoff or a direct point source discharge can transport pollutants, deposits and residues as well as eroded materials from the site into the receiving environment. Storm water may carry with it the following:
    - Spilled fuels
    - Slurry from pavement milling, drillings, and excavations for drainage ditches
    - Suspended particles, such as sand, slits, bentonite, cements
    - Solid waste, such as plastic, paper, bottles, wood

All of the aforementioned discharges can significantly impact water quality in the area. Proper management modalities would be crucial in order to reduce and prevent contamination of water resources surrounding the roads to be rehabilitated in Jbeil Caza.

Accordingly, the impacts on water quality are assessed as: direct, moderate, local, short-term, irreversible, of high likelihood of occurrence and of medium significance.

5.3.1.2.Impacts on Soil Quality

Excavation

Excavation of soil to install new drainage ditches will result in disturbance of soil structure and thus may cause an increase in soil erosion and release of sediments. This will permanently change the structure of the soil and surface geology.

Mismanagement of Solid Waste and Wastewater

Rehabilitation activities, specifically pavement reconstruction will result in the generation of solid and hazardous wastes; mainly rehabilitation waste such as old asphalt layers, crushed sub base aggregates, etc…Improper management of the waste generated from the rehabilitation works, the direct disposal of the domestic-like solid waste (mainly plastic, paper, bottles…) and the direct discharge of domestic-like wastewater (from the portable toilet) generated by the engineers and workers onsite will significantly impact soil quality.

Accidental Leakages

Accidental spills of bituminous materials with construction runoff and storm water might result in soil quality deterioration.

Accordingly, the impacts on soil quality are assessed as: direct, moderate, local, short-term, irreversible, of high likelihood of occurrence and of medium significance.

5.3.1.3.Impacts on Air Quality

Exhaust emissions

Impacts on air quality during the rehabilitation works include exhaust emissions of CO, CO_2, NOx, and SO_2 due to increased traffic flow, combustion of diesel for the movement of vehicles/machinery. Construction vehicles involved in pavement works include but are not limited to:

- Excavators (emission factors presented Table 5-3)
- Vehicles transporting workers to/from site (i.e. buses, mini-vans, cars).
- Delivery vehicles (i.e. aggregate delivery trucks, and light delivery vehicles)

Combustion and vehicle exhaust gases constitute a complex mixture of organic and inorganic substances such as: PM10, NO_2, SO_2 Toluene, Xylenes, and Ozone. These combustion sources are likely to be extremely difficult to quantify due to the unpredicted operational needs throughout the rehabilitation process.

Table 5-3 Emission factors for construction equipment (Ahn, Pan, et.al, 2010)

Equipment	HC (g/hr)	CO (g/hr)	NO_x (g/hr)	PM (g/hr)	CO_2 (g/hr)
Bulldozer	130.09	270.01	806.53	5.56	55.13
Dumper	100.53	272.45	962.29	8.78	83.44
Excavator	56.78	128.26	385.64	2.94	28.84
Grader	75.52	200.45	655.43	5.86	56.48
All equipment	18.34	63.00	105.96	0.367	6.72

Dust emissions

Dust is an almost inevitable consequence of roadwork. Gravel and crushed gravel and hard rock aggregates always contain a proportion of fines, and if the material is dry, a fairly heavy dust cloud can be raised when it is mobilized.

The following activities associated with the rehabilitation phase are anticipated to lead to the generation of dust:

- Excavation and leveling works
- Movement of raw materials transporting vehicles on unpaved surfaces
- Unloading of raw materials
- Open storage of raw materials
- Disturbances to material stockpiles by local winds and material handling, which is of great significance depending on the road location.
- Wind blow during transportation of materials by vehicles and specifically when transporting on unpaved roads.

Dust emissions from each of the sources described above will be largely dictated by the wind conditions in the area. Emission of large quantities of fugitive dust may adversely impact air quality, construction workers and surrounding communities.

Nearby receptors such as churches, schools and residential buildings (shown in Figure R, Figure S, and Figure T in Annex 1) to be disturbed by the generated fugitive emissions are presented in section 4.3.2. The assessment showed that the segments [0+000 - 5+300] of Jbeil R3, [0+000 - 3+000] and [4+300 - 4+500] of Jbeil R4 section 1 are highly urbanized. Mainly, Jbeil R3 is surrounded by numerous sensitive receptors such as churches and schools, located at a distance of less than 10 m from the roads. For instance, the highly affected churches along Jbeil R3 are NaamatAlla Church (0 m), Mar Nicolas Church Remains (4 m away), Mar Estaphan Church Remains (4 m away) and Mar Tadros Church (6 m away). As for Jbeil R4 section 1, nearby schools and places of worship are located specifically between stations [5+800 - 6+400] and [4+300 - 4+500]. Although places of worship are few along Jbeil R4 section 2, they are close to the road to be rehabilitated.

Regarding the agricultural areas, the mostly affected lands by the generated dust emissions are located between the stations [3+100 - 5+300] and [6+650 - 8+500] of Jbeil R3, [3+000 - 4+300], [4+500 - 4+700], [4+950 -5+300], [6+400 – 6+800] and towards the end segment of of Jbeil R4 section 1 and between station [6+200 - 8+800] of Jbeil R4 section 2.

Odor emission

Odors from asphalt fumes can cause unpleasant smells to the surrounding. Sensitive receptors such as churches near the roads at a distance of 5 m (Figure S and Figure T in Annex 1) can be highly affected.

Accordingly, the impacts on air quality can be assessed as: direct, high, local, medium-term, irreversible, of high likelihood of occurrence and of high significance.

5.3.1.4.Impacts on Acoustic Environment

A significant increase in noise is expected during pavement reconstruction along the road sections. Rehabilitation activities may create a problem of noise and vibration generated by construction equipment, truck traffic, and other similar sources. Noise will be mainly generated while mobilizing equipment for the transportation, excavation of land, and raw material transportation.

The road rehabilitation noise and vibration levels highly depend on the type of the equipment/heavy machinery, magnitude and duration of the rehabilitation activities. The main sources of noise are heavy machinery such as, excavators, bob cat, steel roller, pick- up, dump trucks, etc… Noise generating activities, such as pavement milling and drilling, can cause unpleasant noise levels and disrupt teaching activities at nearby schools. The potential impact depends on the magnitude and duration of rehabilitation-related activities. Works such as road markings, signing, etc…, do not generate high noise levels and do not disturb the surrounding environment.

Nearby receptors such as churches, schools and residential buildings (shown in Figure R, Figure S, and Figure T in Annex 1) to be disturbed by the generated noise emissions are presented in section 4.3.2. The assessment showed that the segments [0+000 - 5+300] of Jbeil R3, [0+000 - 3+000] and [4+300 - 4+500] of Jbeil R4 section 1 are highly urbanized. Mainly, Jbeil R3 is surrounded by numerous sensitive receptors such as churches and schools, located at a distance of less than 10 m from the roads. For instance, the highly affected churches along Jbeil R3 are NaamatAlla Church (0 m), Mar Nicolas Church Remains (4 m away), Mar Estaphan Church Remains (4 m away) and Mar Tadros Church (6 m away). As for Jbeil R4 section 1, nearby schools and places of worship are located specifically between stations [5+800 - 6+400] and [4+300 - 4+500]. Although places of worship are few along Jbeil R4 section 2, they are close to the road to be rehabilitated.

Therefore, high noise levels should be minimized to avoid nuisance of the surrounding residents and minimize the health effects of vibration and high noise levels on the construction workers.

Accordingly, the impacts on the acoustic environment are assessed as: direct, moderate, local, short-term, reversible, of high likelihood of occurrence and of moderate significance.

5.3.1.5.Impacts on Visual Intrusion

Visual impacts relate to changes in available views of the landscape, and the effect of those changes on the surrounding environment. Visual intrusion during road rehabilitation works is unlikely to be significant. The road already exists and no major excavation works will be taking place to block a natural scenery view. Impacts on visual intrusion are of very low significance.

Accordingly, the impacts on visual intrusion are assessed as: direct, low, local, short-term, reversible, of low likelihood of occurrence and of negligible significance

5.3.1.6.Impacts on Biodiversity

Given that the project aims to upgrade existing roads by improving drainage, slopes,

embankments, traffic signs, shoulders, and other structures; strengthening pavements; and completing resurfacing (i.e. no widening of roads will take place), expected impacts on natural habitats are potential spillages of wastes, dust raised, and increase in noise, light, and traffic movement during rehabilitation work.

In particular, direct effects on wildlife include the generation of emissions and disturbances such as noise, dust, and pollutants in the soil and vegetation (Rajvanshi *et al.* 2001). In fact, it was 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 influences animal behavior, altering activity patterns, and causing stress, loss of reproductive success, and physiological disturbance. Normally, some animals may vacate the area, while, others may get used to the noise (responses may vary among species). Further, wastewater discharge and illegal dumping of solid waste into the roadside shrublands and riparian habitats can severely affect the local fauna and flora and eventually lead to population destruction. In addition, given that lighting poles will be rehabilitated when needed, additional lighting might affect local fauna in sensitive habitats.

Finally, during rehabilitation, there is an increase in traffic movement; this can induce increased roadkills (i.e. mortality due to vehicular collisions). Animals that are attracted to roads or that need to cross them are more vulnerable.

However, the assessed roads for rehabilitation lie either in urban or rural settlement areas. In other words, the studied (existing) roads involve a path that is already under anthropogenic influences. Both roads in Jbeil are mainly bordered by human settlements, industries, agricultural lands, fallow lands, lines of cultivated trees, or degraded ecosystems with low vegetation cover. However, some segments of the roads involve partly particular biotopes that need special attention.

When Jbeil R3 and Jbeil R4 are very close to rivers, particular biotopes (riparian vegetation) were noted. Any contamination of soil and water can have severe irreversible impacts on the local biodiversity. The project should not affect the concerned aquatic and riparian communities (remaining adapted species) and the surrounding vegetation and animal communities (birds of passage or resident amphibians and reptiles) that could be of ecological significance. In this context, contractors must be careful during the rehabilitation work so that the direct impacts (direct destruction) on these particular biotopes and associated fauna would be minimal. Beside the expected temporary disturbance of the nearby ecosystem, direct destruction of vegetation and population might occur if waste (excavated materials) were discharged directly into the adjacent rivers and valleys.

Alongside rivers and riparian ecosystems, the segments of roads that are surrounded by oak woodlands are considered of a certain criticality. This is the case for Jbeil R4 (El-Mouncef dense oak woodland, between station 6+850 and station 9+680).

Finally, Jbeil R3 is 1 km away from BNR (an IBA), which makes it subtle in terms of bird disturbance. However, given the type of rehabilitation activities and their temporary nature, the project is not expected to hold severe impacts on the nature reserve's biodiversity, including birds. In fact, birds potentially present in the area rest and breed within the nature reserve (i.e. breeding sites are significantly distant from the road). Except for illegal dumping of

construction waste at the BNR, rehabilitation activities for Jbeil R3 are not expected to hold negative impacts on its biodiversity, including both passenger and breeding birds.

Accordingly, the impacts on biodiversity are assessed as: direct, moderate, local, short-term, irreversible, of medium likelihood of occurrence and of medium significance

5.3.1.7.Impacts on Existing Infrastructure

The road rehabilitation works might have adverse impacts on the existing infrastructure including underground cables, sewage network, and water network existing under the road pavement. Random digging and milling of deteriorated road pavement, without previous investigation of possible existence of underground appliances, may interfere with any existing infrastructure; that is possibly serving nearby surrounding residential and agricultural areas. Damage of existing infrastructure, for instance wastewater infrastructure or water networks, can cause several undesirable impacts such as cutting off water supply for irrigation, generation of bad smells, and attraction of water borne diseases and vectors due contaminated water accumulation.

Accordingly, impacts on existing infrastructure are assessed as direct, moderate, local, short-term, reversible, of medium likelihood of occurrence, and of low significance

5.3.1.8.Impacts on Resources Consumption

Freshwater Demand

During the rehabilitation phase, water will be supplied by the Water Establishment of Mount Lebanon by tankers, if needed. Freshwater will be mainly used for dust suppression of the temporary stockpiles onsite.

Worker camps will not be installed since the Contractor will employ low skilled Syrians and Lebanese from the surrounding communities of Jbeil R3 and R4. As a result, the unskilled workers will get their food and water supply from their homes. In addition, the nearby office will provide water for the Contractor's engineers, technical/skilled labor, and the supervising consultants. Consequently, water resources will not be required for domestic purposes.

Water consumption varies and it cannot be estimated as it highly depends on the rehabilitation activities, working days per year and other factors. Rehabilitation activities will consume moderate volumes of water, it will only be for a relatively short finite period.

Energy Demand

During the rehabiltation phase, total pavement reconstruction will require the use of several heavy equipment/machinery that highly consume energy in the form of fuel, leading to the depletion of fossil fuel resources. However, the rehabilitation phase will be of short-term.

Raw Materials Demand

Road the rehabilitation phase, required works will entail the use of raw materials (refer to Table 3-7), leading to depletion of natural resources. Aggregates shall be extracted from legal quarrying sites.

Accordingly, the impacts on resource consumption are assessed as: direct, moderate, local, short-term, irreversible, of high likelihood of occurrence and of medium significance.

5.3.1.9.Impacts on Public and Workers Health and Safety

(1) Occupational Health and Safety

Occupational hazards during the rehabilitation works are associated with working in all weather conditions, handling heavy machinery and other sophisticated rehabilitation equipment and long hours of work. In addition, continuous exposure to environmental emissions resulting from the rehabilitation activities can induce health problems. Moreover, a badly planned site can increase the risk of accidents and injuries from falls of materials and collisions between workers and machinery or equipment. Finally, prevention and protective measures should be introduced according to priorities. The potential types of occupational hazards that might occur during the rehabilitation works of the roads include the following:

Physical hazards

Physical hazards are potential accidents or injuries or illnesses that occur due to repetitive exposure to mechanical action or work activity (IFC, 2007). Forms of physical hazards are but not limited to the following:

Slips, Trips and Falls: Slips, trips and falls have been identified as being the most hazardous feature of survey sites. Occasionally, as a survey progresses, increasing numbers of people crossing these areas results in gradually worsening conditions.

Unplanned Trenching: Vibration may be caused from heavy equipment or from street traffic. Moving heavy equipment may include bulldozers, backhoes, loaders, and/or dump trucks. Equipment and materials may collapse trench walls if operated or stored too close to the trench edge. Water and temperature changes can pose a serious threat to excavations and trenches. Sources of water on job sites include surface water, the level of the water table, moisture content, rain, and cities with existing utilities in the right-of-way.

Environment Hazard: those types of hazards are due to environmental factors like the weather, sun and similar factors and they may lead to the following:

- Hypothermia and Hyperthermia due to sun exposure or sudden temperature change
- Hypotension and Hypertension due to lack of nutrients and medical history
- Dehydration lost due to lack of fluids and excess loss of body water through urine, tears, stool and sweat. An individual can sweat an average of 1.1 liters / hour when exposed to sun.
- Fire caused by accident or ignited by outsiders that will lead to external and internal burns.
- Bites and stings from the wilderness and most common are bees and snakes.

Noise: Extended exposure to excessive noise levels can cause noise-induced hearing loss specifically noise levels above 85 (dB) can cause hearing loss.

Vibrations: Earthwork activities and material loading / unloading activities generate levels of vibrations. Exposure to high level of vibrations for a significant duration will affect workers' health such as carpal tunnel syndrome and permanent damage to the nerves. Whole-body vibration can occur from operating large mobile equipment such as drillers, air hammers, pile drivers, tractors, graders, excavators and many more. Hand-arm vibration can result from using hand-held equipment such as drills, hammers and disc grinders. Hand-arm vibration may cause carpal tunnel syndrome, a disease that affects the fingers and hands.

Vehicle Hazards

Vehicles transporting personnel and equipment to the study area are subject to vehicle hazards (transport impacts, road accidents, vehicle crashes). Vehicle crashes can be divided into the following types:

- Frontal and rear impact
- Rotational impact
- Rollover

Chemical Hazards

Chemical hazards occur due to exposure to toxic, corrosive, sensitizing or oxidative substances. During rehabilitation activities, employees are mainly at risk of being exposed to asphalt fumes from pavement works among other solvents. Exposure to asphalt fumes is linked to acute effects such as headache, fatigue, reduced appetite, breathing problems, and skin irritation (Norseth et al, 1991).

Ergonomic Hazard

Ergonomic factors, such as repetitive motion, overexertion, and manual handling lead to occupational injuries such as strains, low back pain, fatigue and others. According to Sang et al (2007), there has been, for years, an increase in rates of work-related musculoskeletal disorders in highway construction specifically and the construction industry in general. Common causes are manual material handling and awkward postures, especially when lifting.

(2) Public Health and Safety

Most of the potential impacts on public health and safety comprise of those described in the previous sections. For instance, the impacts on water quality and availability, air quality soil quality, etc… all have consequences on human health. Nonetheless, some potential impacts, which were not yet discussed, are addressed in this section. First, during the rehabilitation activities, risk of road traffic accidents might increase in between vehicles, pedestrians and vehicles, specifically in highly populated areas surrounded by residential buildings and schools. Second, the proximity of the roads to communities and the open access to rehabilitation sites consist of a potential risk to the public, namely the risk of injuries as a consequence of falls or contact with heavy equipment. This might occur in case of unauthorized or accidental entry of

residents into areas where the rehabilitation activities are taking place. This risk, however, is commonly encountered in cases of road rehabilitation projects and will be addressed through a standard set of best practices. This includes the usage of proper signage and barriers, in addition to flagmen and temporary traffic signs when necessary (refer to section 6.1.8).

Accordingly, impacts on health and safety are assessed as: negative, moderate, local, short-term, irreversible, of high likelihood of occurrence and of medium significance

5.3.2 Potential Negative Social Impacts during Rehabilitation

Generally, during the rehabilitation and maintenance activities, adverse impacts on socio-economic conditions are associated with nuisance, traffic disturbance, labor influx and increase in GBV risks associated with SEA and SH, inappropriate labor conditions and obstruction of temporary access routes to sensitive receptors and others. Therefore the potential impacts on socio-economic conditions of laborers onsite and the residents of the surrounding communities of Jbeil R3 and R4 are presented below.

The adverse impacts of the project on socio-economic conditions will be temporary in nature. However, implementing appropriate measures to mitigate these impacts is the core responsibility of the Contractor.

5.3.2.1.Impacts on Socio-Economic Conditions of Surrounding Communities

(1) Traffic Disturbance and Nuisance

During the rehabilitation works of the Jbeil R3 and R4, potential socioeconomic impacts include nuisance and traffic disturbance from the rehabilitation activities onsite. The most significant sources of noise and traffic are heavy machinery and the movement of transport vehicles into and from the rehabilitation site, leading to increase in commuting time and inconvenience to roads users.

(2) Labor Influx and Labor Induced SEA

Potential labor influx will increase the risk of labor induced SEA towards women in the surrounding communities. SEA is defined as “any actual or attempted abuse of a position of vulnerability, differential power, or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another”. Sexual abuse is further defined as “the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions” (World Bank, 2018). In this context, project beneficiaries or members of project-affected communities may experience SEA (World Bank, 2018).

Knowing that the project is expected to employ low skilled Syrians and Lebanese already living in the community around the selected roads for rehabilitation, large labor influx of outsiders into the communities might not occur. Therefore, SEA risks towards women in the surrounding community is anticipated to be low.

(3) Obstruction of Access Routes to Sensitive Receptors

Impacts on sensitive receptors include, temporary obstruction of access routes to residential units, schools hospitals located at the borders of the roads to be rehabilitated. In specific the assessment showed that the most urbanized roads to be affected by temporary obstruction of sensitive receptors are the segments [0+000 - 5+300] of Jbeil R3, [0+000 - 3+000] and [4+300 - 4+500] of Jbeil R4 section 1. In other words, these roads will be highly affected since they are surrounded by numerous sensitive receptors such as churches and schools, located at a distance of less than 10 m from the roads (refer to Table E and Table F in Annex 1). The highly affected churches along Jbeil R3 are NaamatAlla Church (0 m), Mar Nicolas Church Remains (4 m away), Mar Estaphan Church Remains (4 m away) and Mar Tadros Church (6 m away).

Regarding the agricultural areas, the mostly affected lands by the temporary obstruction of access routes are located between the stations [3+100 - 5+300] and [6+650 - 8+500] of Jbeil R3, [3+000 - 4+300], [4+500 - 4+700], [4+950 -5+300], [6+400 – 6+800] and towards the end segment of of Jbeil R4 section 1 and between station [6+200 - 8+800] of Jbeil R section 2.

5.3.2.1.Impacts on Socio-Economic Conditions of Labor

(1) Labor Induced SH

The employment of both men and women in REP project might increase the risk of SH towards female employees at the workplace. SH is defined as “Unwelcome sexual advances, requests for sexual favors, and other unwanted verbal or physical conduct of a sexual nature occurring between personnel/staff working on the project” (World Bank, 2018).

(2) Child Labor

The immense needs of vulnerable communities may result in underage workers making themselves available for work. This could result in the employment of child laborers. Employment of underage labors is a violation of the Lebanese Law No. 0 dated 1946. Given the type of planned rehabilitation works, children can get injured in the workplace. In this context, employers are subject to the youth employment provisions under Law No. 0.

(3) Inadequate Labor Conditions

The project can result in poor labor conditions in the case of the violation of labor law. The project beneficiaries, Lebanese and Syrian communities, might not have work permissions or contractual protections with contractors and their wages are to be set by the market. While Contractors should follow local labor laws, in Lebanon, monitoring of whether local labor laws are followed is not always performed. Therefore, large and vulnerable population of beneficiaries may be at risk of working for wages that are less than those recognized by the law and may be forced into accords that are not consistent with the law (e.g. work schedules or rest periods).

(4) Social tensions and conflict over job-sharing and dissatisfaction with allocation of project-generated jobs.

The project is expected provide job opportunities for both Syrians and low-skilled Lebanese in host communities. Syrians already tend to work in low-paid work, often decreasing the rate of salaries in the formal labor market and inducing conflicts within local communities. Moreover, potential perceptions that project employment ratios favor Syrian communities might further worsen the social tensions between the two groups.

(5) Risk of under-participation or underemployment or discrimination of women

The risk of under-participation or underemployment or discrimination of women in the context of REP project will be high, if the Contractor doesn't set specific percentage of women employment to benefit from the project. Moreover, women's engagement in construction works is not common and also not encouraged, according to Lebanon's social and cultural norms.

5.4 Potential Positive Impacts during Operation

5.4.1 Potential Positive Environmental Impacts

The potential positive environmental impacts of the project are associated with enhanced road conditions.

First, improved drainage helps in decreasing contaminated storm water run-off and consequently helps limit the impact on the two nearby rivers (Wadi Mouhnane and Wadi Baachta). Further, slope stabilization activities will result in a positive impact as it decreases the chances of soil erosion. Improved drainage decreases likelihood of run-off water to reach and contaminate nearby soil. As a result, the project is expected to have a positive impact on soil quality during operation. Finally, the proposed rehabilitation works will result in less congestion and delays. Moreover, it is predicted that the project will increase the average speed per vehicle and reduce travel time which would typically improve the overall air quality through potential reduction in CO_2 emissions.

5.4.2 Potential Positive Social Impacts

The social benefits of the rehabilitation work, during operation, include transport connectivity and easier access to rural, peri-urban and urban areas. Additionally, the rehabilitated roads will result in potential reduction in traffic congestion, reduced travel time and transport cost. The improvement in the safety conditions of the roads (due to improved drainage and lighting, additional safety barriers, and slope protection measures) will lead to potential reduction in road accidents, during the operation of the Jbeil R3 and R4. In turn, this will result in economic savings from the reduced cost of road crash injuries and fatalities. Moreover, employment opportunities will be offered for a short period of time, knowing that the Contractor will be responsible for the routine maintenance of the roads, during the one year of Defects Liability Period (post rehabilitation phase).

5.5 Potential Negative Impacts during Operation

The negative impacts assessment, during the operation phase, mainly focuses on the maintenance activities that might be required during the Defects Liability Period (one-year period). However, it is important to mention that the Contractor might not perform any maintenance activities, if not necessary.

5.5.1 Potential Negative Environmental Impacts

5.5.1.1.Impacts on Water and Soil Quality

Potential impacts on water quality should be considered due to the particularity of the project area, knowing that Jbeil R3 and R4 are in close proximity to Wadi Mouhnane and Wadi Baachta. Spills of chemicals and pollutants during maintenance activities can affect soil and water quality, if such activities are not managed properly.

Accordingly, impacts on water and soil quality are assessed as: direct, moderate, long-term, local, irreversible, of medium likelihood of occurrence, and of medium significance

5.5.1.2.Impacts on Air Quality and Odor Emission

Druing the operation phase of the project, impacts on air quality are associated with maintenance activities and movement of vehicles. This includes dust and exhaust emissions. The extent of the impact will depend on type and duration of required maintenance activities.

Moreover, the main expected vehicle emissions are (World Bank, 1997):

- Nitrogen oxides (NOx) which is a by-product of fuel combustion in combustion chambers, under conditions of extreme heat and pressure,
- Hydrocarbons (HC) which are produced due to the incomplete combustion of fuel and its evaporation. The emissions of hydrocarbons are strongly correlated with the type of fuel used. The most notorious HC produced are benzene and ethylene.
- Carbon monoxide (CO) which is the result of incomplete combustion in engines
- Sulfur dioxides (SOx) emissions which are directly linked to the sulfur content of the fuel.

Accordingly, impacts on air quality are assessed as: direct, moderate, short-term, local, and irreversible, of medium likelihood of occurrence and of medium significance

5.5.1.3.Impacts on Acoustic Environment

The operational phase is expected to be associated with increased noise levels during maintenance activities. Noise is mainly associated with four main sources: a) vehicles noise, b) friction between vehicles and the road surface, c) driver behavior, and d) maintenance activities (Table 5-4) (World Bank, 1997).

Table 5-4 Sources of acoustic pollution during road operation

Noise Source	Impacts
Vehicle noise	Transportation vehicles generally produce noise from the engine, transmission, suspension, braking, and stop-and go traffic conditions. The noise levels are expected to increase with the poor maintenance of vehicles accessing the road.
Road noise	Contact between tires and pavement significantly contributes to overall traffic noise. The level depends on the type and condition of tires and pavement. The frictional noise increases with higher speed and during sudden braking.
Driver behaviour	Vehicles' horns, loud music, shouting, sudden braking or accelerating contributes to traffic noise.
Road maintenance	Periodically, road maintenance is generally required. Such activities will utilize heavy machinery which will contribute to noise pollution.

The exposure to increased noise levels can affect the welfare of local residents, both physiologically and psychologically. Noise exposure is considered a source of annoyance which might result in increased stress levels and health impacts. It can cause auditory fatigue, temporary and permanent lessening of hearing ability and sleep disorders (World Bank, 1997).

Accordingly, impacts on acoustic environment are assessed as: direct, moderate, short-term, local, reversible, of high likelihood of occurrence and of medium significance

5.5.1.4.Impacts on Biodiversity

During the operation phase of the project, in general, the impacts on biodiversity are expected to be very limited as no additional roads will be built. On the contrary, rehabilitation of existing roads will probably improve the conditions of adjacent lands and plant communities (the impacts of vehicle-generated dust from unpaved roads will be reduced).

The main expected impacts during operation on the local ecosystem include (1) the potential sedimentation of heavy metals due to surface runoff (Batool et al, 2012) if drainage systems were not fixed; (2) the potential spills during maintenance activities, and (3) the increase in light pollution levels, when roads are equipped with additional light (the project will involve the rehabilitation of lighting poles and the provision of additional lighting brackets when needed).

However, light pollution can be reduced if the contractor used green lights when new lights are deemed necessarily. Moreover, given that the concerned roads generally involve paths that are already under anthropogenic influences, potential impacts are expected to be of low significance. Only limited segments of ecological significance can witness further disturbance from the project. This includes the road segment in El-Mouncef that is surrounded by a dense oak woodland (Jbeil R4 between station 6+850 and station 9+680).

Accordingly, impacts on biodiversity are assessed as: direct, moderate, local, long-term, irreversible, of high likelihood of occurrence, and of medium significance

5.5.1.5.Impacts on Energy Consumption

Energy consumption is expected to be high during the operation phase of the project due to additional lightings. Moreover, maintenance works will require the use of several heavy equipment/machinery that highly consume energy in the form of fossil fuel, leading to the depletion of fossil fuel resources.

Accordingly, impacts on energy consumption were assessed as: direct, low, short-term, local, and reversible, of moderate likelihood of occurrence and of medium significance.

5.5.1.6.Impacts on Public and Workers Health and Safety

During the operation phase of the project, occupational health hazards can be attributed to maintenance-related accidents. Proper supervision and the implementation of adequate safety measures will limit the occurrence of accidents from maintenance activities. Any maintenance works and their potential impacts are expected to be similar in nature to those of this project's rehabilitation phase (disturbance of traffic and road accidents).

Accordingly, impacts on health and safety are assessed as: direct, moderate, local, short-term, reversible, of medium likelihood of occurrence, and of medium significance

5.6 Summary of Potential Environmental Impacts

Rehablitation phase

During the rehabilitation phase of the project, the impact on air quality is expected to be of high significance.

Table 5-5 Summary of potential negative environmental impacts during rehabilitation

Environmental Receptor	Impacts															Significance
	Accidental leakages of concrete pouring, toxic asphalt substances , chemical paints	Excavations , milling and drillings	Contaminated storm water runoff	Domestic-like solid waste (plastic, paper, bottles and others)	Waste such as old asphalt layers, crushed sub base aggregates	Vehicles transporting workers	Delivery vehicles	Unloading and open storage of raw materials	Odors from asphalt fumes	Mobilization and use of are heavy machinery	Changes in available views of the landscape	Exposure to environmental emissions	Road traffic accidents	Handling heavy machinery	Physical, chemical, biological and ergonomic hazards	
Water Quality	x	x	x	x												
Soil Quality	x	x	x	x	x											
Air Quality		x				x	x	x	x							
Acoustic Environment		x				x	x			x						
Biodiversity	x	x	x	x	x						x					
Visual Amenity											x					
Existing Infrastructure		x														
Resources Consumption										x						
Health and Safety												x	x	x	x	

Operation phase

Summary of negative environmental impacts during the operation phase are presented in Table 5-6.

Table 5-6 Summary of potential negative environmental impacts during operation

Environmental Receptor	Impacts						Significance
	Accidental spills of chemicals and pollutants	Dust and exhaust emissions	Use of vehicles heavy equipment and machinery	Accidents from Handling of heavy machinery	Disturbance of traffic and road accidents	Light and noise pollution	
Water and Soil Quality	x						
Air Quality		x	x				
Acoustic Environment			x				
Biodiversity	x	x				x	
Resources Consumption			x				
Health and Safety				x	x		

Significance	
High	
Medium	
Low	
Negligible	

During the operation phase of the project, the main environmental positive impacts are presented in Table 5-7.

Table 5-7 Summary of positive environmental impacts during operation

Environmental Receptor	Positive Impacts
Water quality	Decreased contaminated stormwater runoff due to the improved drainage
Soil quality	Decreased chances of soil erosion due to slope stabilization
Air quality	Improvement in the overall air quality through potential reduction in CO_2 emissions, as a result of increased the average speed per vehicle and reduced travel time

5.7 Summary of Potential Social Impacts

Rehabilitation Phase

Summary of expected positive and negative social impacts of the project during its rehabilitation are presented in Table 5-8

Table 5-8 Summary of potential positive and negative social impacts during rehabilitation

Potential Positive Social Impacts
• Creating direct and indirect short term jobs for Lebanese and Syrians living in the surrounding community • Enhancing economic development and livelihood opportunities • Strengthening Lebanese and Syrian workers' skills and experience in road rehabilitation and maintenance
Potential Negative Social Impacts
• Labor influx (in case the contractor doesn't recruit labor from the surrounding community) and potential risk of labor induced SH towards female workers and SEA towards women in the surrounding community (due to the close proximity of residents and schools to the roads to be rehabilitated). • Potential risk of child labor • Poor labor conditions • Dissatisfaction with job allocation • Risk of under-participation or underemployment of women • Nuisance and traffic disturbance • Temporary obstruction of access routes to sensitive receptors • Inadequately functioning GRM

Operation Phase

Summary of expected positive social impacts of the project during its operation are presented in and Table 5-9.

Table 5-9 Summary of potential positive social impacts during operation

Potential Positive Social Impacts
• Enhanced transport connectivity • Potential reduction in traffic congestion, reduced travel time and transport cost • Potential reduction in road accidents • Economic savings from the reduced cost of road crash injuries and fatalities • Short-term employment opportunities for routine maintenance (during the first year of operation)

6. Mitigation of Environmental and Social Impacts

6.1 Mitigation Measures during Rehabilitation

As part of the ESMP, mitigation refers to the set of measures taken to eliminate, reduce, or remedy potential undesirable effects resulting from the rehabilitation of the proposed project.

Generally, mitigation measures are to be considered in all the developmental stages of the project. Mitigation is a description of the measures visualized in order to avoid, reduce and where practicable remedy significant adverse impacts. Moreover, it includes decisions about the modification of proposed development avoid, reduce or remedy the adverse environmental impacts that are identified.

6.1.1 Water and Soil Quality

Impacts on water and soil quality were assessed as: direct, high, local, short-term, irreversible, of high likelihood of occurrence and of medium significance. Thus, the proposed mitigation measures include:

Control of Soil Manipulation Activities

- 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
- Placement of geotextile silt traps as appropriate, especially in areas close to water bodies (when Jbeil R3 and Jbeil R4 are in close proximity to the Wadi Mouhnane River and Wadi Baachta River respectively).

Control of Accidental Spills

- All refueling and maintenance operations shall take place off-site, vehicles should be fueled up before arriving to the road section
- A spill response plan shall be in place and all workers should be trained on its implementation.

Management of Solid Waste

- Good site practices including the effective disposal of all wastes generated on-site should be adopted.
- The generated waste onsite should be properly segregated at source into recyclables and organic waste in appropriately labelled waste bins. Sorting at source of domestic and general waste should be implemented.
- Sufficient waste disposal points must be provided and regular collection for disposal must take place near the road.
- Adequate bins for collection and storage of waste materials should be provided.
- Prevent the overfilling of the waste containers.

- Wastewater shall not be discharged onto the open ground or into any water body. In case the portacabin toilet is not close enough to the existing network to be linked directly to it, the portacabin toilet will be linked to a polyethylene storage tank. If so, the following should be done:
    - A specialized contractor will be selected to periodically collect (pump out) the wastewater from the polyethylene tank.
    - The supervising consultant should inspect it regularly to check for any leakages and to ensure that the generated wastewater is properly collected before it's full.
- Domestic-like waste shall be removed daily from the site.
- Excavated soil should be stored and transported offsite to the nearest licensed dumpsite "Hbaline dumpsite"due to possible heavy metal contamination.
- Any excavated unsuitable material should be removed from site within 24 hours. Reuse of contaminated soil material is prohibited and random disposal of this material in open abandoned areas is never allowed.

Control of Stormwater Runoff

- In case of temporary storage of excavated materials, accidental contamination or spills of the removed soil should be avoided to limit contamination of storm water runoff and in turn the surrounding streams.
- Any stockpiled construction material should be covered with an impermeable layer to avoid contamination of stormwater runoff.

6.1.2 Air quality

Impacts on air quality were assessed as: direct, high, local, medium-term, irreversible, of high likelihood of occurrence and of high significance. Thus, the proposed mitigation measures include:

Control of Exhaust Emissions

- Ensuring maintenance of all construction equipment regularly, at least once a month.
- Machinery and equipment should be equipped with air pollution control equipment that should be monitored regularly to ensure its effective operation.
- Avoiding idling time of machinery.
- Ensuring regular maintenance of vehicles.

Control of Dust Emissions

- Using dust-suppression methods to reduce emission of particulate matter into the surroundings.
- Prohibit dust-generating activities during excessively windy periods.
- Prohibit burning of generated waste material.
- Covering raw material stockpiles with plastic impermeable layers, when raw materials are not in use.
- Avoid excessive vehicular movement on unpaved roads.
- Vehicle maximum speed limit in work zones should be decreased to 25 km/hr.

- Trucks hauling raw materials into the construction site should be covered properly with tarpaulins.
- All trucks and vehicles exiting the rehabilitation site should be dust-free.
- Stockpiles of fine material such as topsoil material, aggregates etc. shall be protected from wind.
- In case of asphalt milling, spray water on exposed surfaces during dry periods especially near schools, hospitals, rural communities, agricultural areas, etc…
- Maintaining stockpiles at minimum heights
- Contractors shall regularly inspect stockpiles, exposed work areas and rehabilitation work practices.
- Spills or leakages are effectively recorded and reported to the adequate management entity, along with immediate clean-up.
- Daily cleaning of streets and pathways in vicinity of rehabilitation site that are affected by soil and dust

Control of Odor Emissions

- Transport trucks, specifically trucks transporting asphalt, are to be tightly covered at all hauling times to reduce as much as possible release of unpleasant odors.

6.1.3 Acoustic Environment

Impacts on acoustic environment were assessed as: direct, moderate, local, short-term, reversible, of high likelihood of occurrence and of medium significance. Thus, the proposed mitigation measures include:

During the road bypass rehabilitation works, excessive noise emissions can be reduced by adopting the following measures:

- Applying an appropriate schedule such as from 8 am to 4 pm to avoid any works that may cause noise and vibration during nighttime. Additionally, nighttime activities should be done using noise reducing means or low-noise technologies.
- Using vehicles and equipment that meet national standards for noise and vibration.
- Regular maintenance of the machinery, equipment and vehicle should be carried out to prevent excessive noise.
- Publishing and registering allowed working time of construction machines with local authorities and ensuring strict compliance with set times.
- Restricting the use of noisy machines and/or adopting noise-reducing means (silencers) for construction machines, especially near sensitive areas.

6.1.4 Biodiversity

Impacts on the biodiversity were assessed as: direct, moderate, local, medium-term, irreversible, of medium likelihood of occurrence and of medium significance. Thus, the proposed mitigation measures are:

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.).

- A waste management plan must be taken to avoid contaminating the soil and water
- Workers should be instructed to protect flora and fauna when feasible as well as their habitats;
- Washing, maintenance and service of vehicles and machinery should not be done closer to particular biotopes (forests, valleys, riparian ecosystems);
- Solid waste, rehabilitation debris should not be dumped into the natural habitat (namely the dense valley in El-Mouncef (Jbeil R4) and BNR (Jbeil R3));
- Restricting the use of noisy machines and/or adopting noise-reducing means (silencers) for construction machines, especially near sensitive areas (dense woodland in Monsef (Jbeil R4), and near BNR (Jbeil R3);
- Water spraying must be done frequently in order to avoid dust accumulation on adjacent vegetation.
- Rehabilitation activities must not take place during the two migration seasons for birds in order to avoid disturbing passenger birds (if feasible, namely for Jbeil R3, BNR).
- Road cross-section must be fixed during the rehabilitation phase to reduce the impact on biodiversity, for example, by flattening side slopes. This makes crossing easier for animals that find roads a physical barrier (WB). Also, providing longer sight lines for drivers is recommended as it can reduce collisions with animals by allowing more reaction time.

6.1.5 Existing Infrastructure

The impacts on the existing infrastructure were assessed as direct, moderate, local, short-term, reversible, of medium likelihood of occurrence, and of low significance. Following are the mitigation measures:

- Prepare procedures for rapid notification to the concerned Municipality or public entity and assistance with re-instatement, in the event of any disruption of public utilities.
- Splitting works into the road segments will be done to ensure quick progression through road while causing minimal disruption to traffic.

6.1.6 Visual Amenity

The impacts on visual amenity were assessed as of negligible significance. Thus, the proposed mitigation measures are:

- Covering of temporary stockpiled excavations on the side of the road
- Ensuring that the light source is the minimum intensity for the required purpose;
- Ensuring that lights are turned off by timer or manually when they are not needed;
- Ensuring that fittings are chosen that direct light accurately to where it is needed;
- Ensuring that the type of light chosen is the least likely to cause light pollution;

6.1.7 Resources Consumption

Impacts on resources consumption were assessed as: direct, high, moderate, short-term, irreversible, of high likelihood of occurrence and of medium significance. Thus, the proposed mitigation measures include:

Energy Demand Control

- Ensuring that equipment that are not in use are turned off.
- Conducting regular maintenance and efficient operation of machinery.
- Vehicles should not be allowed to remain idle for long periods.
- Recording monthly fuel consumption.

Raw Material Demand Control

In the context of the project, the Contractor must acquire the required raw materials from a licensed quarry.

6.1.8 Health and Safety

6.1.8.1. Occupational Health and Safety (OHS)

Impacts on health and safety were assessed as: negative, moderate, local, short-term, irreversible, of high likelihood of occurrence and of medium significance.

According to IFC (2007), preventive and protective measures should be introduced according to the following order of priority:

- Elimination through eradicating the activity or source of risk from the work process, such as by substituting a hazardous chemical by a safer chemical.
- Control through adopting engineering controls at the source of impact, such as by acoustic insulation.
- Minimization through designing safe work systems and administrative or institutional control measures, such as by job rotation or training safe work procedures.
- Limitation through providing, using, and maintaining appropriate PPE in conjunction with training, such as by using masks and gloves.

Specific measures according to IFC (2007) to limit impacts due to the open nature of rehabilitation sites and their proximity to the community include:

- Measures to prevent unauthorized access to dangerous areas should be in place
- Openings should be sealed by gates or removable chains
- Fall prevention and protection measures should be implemented, such as the installation of guardrails with mid-rails and toe boards at the edge of any fall hazard area
- Signage should be in accordance with international standards and be well known to, and easily understood by workers, visitors and the general public as appropriate

- Marking all energized electrical devices and lines with warning signs
- Establishing rights-of-way, site speed limits, vehicle inspection requirements, operating rules and procedures, and control of traffic patterns or direction

Training of Personnel

Training is an essential component of safety and health management since workers who perform tasks without adequate training can cause themselves or others serious injuries or even death. Therefore, the following trainings should be implemented (Muiruri & Mulinge, 2014):

- Ensure that all workers are given proper site-specific instructions on occupational health and safety prior to commencing work.
- The Occupational Health and Safety training should consist of hazard awareness and control measures.
- The training should ensure proper usage of personal protective equipment (PPE).
- The trainees should acquire knowledge of emergency procedures and preventive actions.
- There should also be job-specific health and safety training.
- Additional training should be provided if risks change.
- Refresher training should be provided periodically, if skills are not frequently used.

Noise Emissions

According to IFC (2007), the following should be implemented:

- Employees should not be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection.
- Another way of protection can be achieved through limiting the duration of noise exposure. For instance, for every 3 dB (A) increase in sound levels, the allowed exposure period should be reduced by 50 percent.
- Periodic medical hearing checks should be performed on employees who are exposed to high noise levels.

Health and Safety Signs

Examples of signs that must be present at the rehabilitation site include but are not limited to the following (DOLIDAR, 2017):

- Wear safety helmets and reflective jackets
- Permit to work areas
- Falling Hazard, Use safety belt
- Watch for moving equipment
- Wear safety footwear
- Wear hearing protection
- Wear eye protection
- First aid

- Danger of electricity
- No smoking
- Work in progress
- Stop and go

First Aid and Injuries

The availability of first aid kits and the adoption of the following recommendations is essential in order to respond quickly and efficiently to any accident or injury:

- At least one laborer per each group of workers onsite should be appointed to respond to emergency cases, on condition that adequate first aid training is provided.
- One employee for every 25 employees on site should be trained in first aid. The assigned personnel should be provided with appropriate identification, including a red hard hat with a white "red cross" symbol and an identification badge (CDR, 2007).
- All workers onsite should know where the first aid facilities are located and how to adequately use first aid kits.
- A full list of nearby hospitals, medical centers and emergency contact numbers should be provided to workers onsite.
- All injuries or accidents at the rehabilitation site should be reported immediately and the contractor should maintain and keep a record of accidents or illnesses.
- Designing machines to eliminate trap hazards and ensuring that extremities are kept out of harm's way under normal operating conditions.
- Turning off or disconnecting machinery with exposed moving parts.
- Marking all energized electrical devices and lines with warning signs.
- Checking all electrical cords, cables and hand power tools for frayed and exposed cords and following manufacture recommendations for maximum permitted operational voltage.
- Protecting power cords and extensions from physical damages like traffic and environmental factors like getting wet from rain.
- Use mechanical assists to eliminate or reduce exertions required to lift heavy material, hold tools and work objects.

Personal Protective Equipment (PPE)

Proper use of PPEs is essential to limit the occurrence of occupational hazards. Accordingly, the following should be implemented (DOLIDAR, 2017):

- An adequate supply of suitable personnel protective equipment (PPE) such as hard hats, safety boots, reflective jackets, and others should be maintained.
- The PPEs (specifically hard hat and reflective jacket) provided to managers and safety officers should have a different color than the PPEs of the rehabilitation workers onsite.
- Ensure that workers wear PPEs all the time during working hours.
- Workers must be trained on the proper and effective use of personal protective equipment.

- Workers should be aware of the potential risks that they might encounter, in case of not wearing their PPEs.
- Where there is a risk of injury from falling objects, safety helmets must be provided, and worn by the workers.
- Adequate eye protection should be provided and worn whenever there is a possibility of eye injuries.
- When working in an area or with machines that have high noise levels, hearing protection must be worn.
- Gloves must be provided to the workers and the type of the gloves must be appropriate to the type of work being executed.
- Respiratory protection appropriate to a given working activity should be provided to the workers who are exposed to respiratory hazards.

The following PPE should be used when handling and working with asphalt (NIOSH, 2003):

- Wearing thermally insulated gloves to keep asphalt from burning or irritating the skin.
- Wearing long-sleeve shirts and long pants without cuffs and keeping the sleeves rolled down and close to the collar.
- Wearing Steel-toed safety shoes.
- Wearing a face shield, not just safety glasses.

The following mitigation measures should be adopted by labor when handling and working with asphalt (NIOSH, 2003):

- Never stick your head in an asphalt tank or mixing container.
- Never lean over a kettle. Stay upwind from asphalt if possible.
- Enclosing mixing and stirring operations.
- Stop what you're doing if you notice symptoms. Ask your foreman for advice.
- Keep asphalt off your skin and out of your eyes.
- If you do get asphalt in your eyes, flush with water for 15 minutes.
- Eating, drinking and smoking are prohibited during any asphalt activity.

6.1.8.2.Public Health and Safety (PHS)

Site Layout and Planning

- Designing carefully the rehabilitation site in order to avoid or reduce accidents due to trips, slips, and collisions (General layouts are set in Annex 2).
- Providing roads within the zones being rehabilitated with speed limits signs of 25 km/hr to decrease risks of collisions and accidents.
- Restricting access to the zones of unfinished works and providing guards to control entrances and exits.
- No work activities are to be conducted without the presence of barriers, temporary traffic lights, and flagmen if necessary, which are required to warn the public of the existing rehabilitation site and its activities.

Traffic Diversion

Exact locations and distances of detours are to be set by the site engineer. These points are set according to work progress, location and traffic. Moreover, illustrated detour signage should be displayed around the site as necessary. In addition, the approximate location of signs is shown on the drawings (Annex 2). Exact locations are to be determined on site upon engineer's approval.

- The contractor has to ensure access diversions for traffic at each stage of work and to provide all necessary requirements to facilitate the continuity of traffic circulation.
- Prior to any works, the contractor shall submit to the engineer a detailed method statement showing and describing the following:
    - The division of the works into phases and sections
    - The various traffic diversions related to each phase of the works.
    - The temporary diversion of the different services and utilities (avoid continuous disturbance).
- Adequate warning signs and security of the site, namely through barriers, should be provided during non-working hours.
- Where the pavement crosses service entrances (houses or shops) which are higher or lower than the pavement edge level, the contractor has to construct concrete steps as directed by the engineer on site. Steps are constructed wherever the difference in elevation between the entrance and pavement levels are more than 250 mm.
- In case where the pavement edge limit crosses a parking or a pedestrian footpath, a depressed sidewalk curb shall be applied as shown on drawings (Annex 2) and directed by the engineer.

Noise Emissions

- Noise levels should be maintained within the national permissible limits (presented in Table 2-4) and limited to working hours as allowed by obtained permits.
- Transportation of construction material during regular working hours should be minimized, when possible.

6.2 Mitigation Measures during Operation

6.2.1 Water and Soil Quality

The impacts of the project on water and soil quality were assessed as: direct, moderate, long-term, local, and irreversible, of medium likelihood of occurrence and of moderate significance. Therefore, the proposed mitigation measures include the following:

- All refueling and maintenance operations shall take place off-site, vehicles should be fueled up before arriving to the road section
- A spill response plan shall be in place and all workers should be trained on its implementation.

- Provision of adequate bins for collection and storage of waste material including litterbins and waste skips
- Preventing the overfilling of the waste containers placed on the road

6.2.2 Air Quality

The impacts on the air quality were assessed as: direct, moderate, short-term, local, and irreversible, of medium likelihood of occurrence and of medium significance. Therefore, the proposed mitigation measures include the following:

- Ensuring maintenance of all construction equipment regularly, at least once a month.
- Machinery and equipment should be equipped with air pollution control equipment that should be monitored regularly to ensure its effective operation.
- Avoiding idling time of machinery.
- Using dust-suppression methods to reduce emission of particulate matter into the surroundings.
- Prohibit dust-generating activities during excessively windy periods.
- Vehicle maximum speed limit in work zones should be decreased to 25 km/hr.

6.2.3 Acoustic Environment

The impacts on the acoustic environment were assessed as: direct, moderate, short-term, local, and reversible, of high likelihood of occurrence and of medium significance. Therefore, the main proposed mitigation measure includes applying an appropriate schedule for maintenance activities to avoid any works that may cause noise and vibration, specifically during 8 am to 4 pm. Any nighttime activities should be done using noise reducing means or low-noise technologies.

6.2.4 Biodiversity

Impacts were assessed as direct, moderate, local, long-term, irreversible, of high likelihood of occurrence, and of medium significance. In this context, mitigation measures include:

During the operation of the project, maintenance activities must be conducted properly in order to avoid spillages and natural habitats contamination. Moreover, given that light pollution will increase as lighting poles will be fixed, however, if green lights are to be used, the local fauna will be less disturbed. Finally, road cross-section must be fixed during the rehabilitation phase to reduce the impact on biodiversity when roads are operational, for example, by flattening side slopes. This makes crossing easier for animals that find roads a physical barrier (WB). Also, providing longer sight lines for drivers is recommended as it can reduce collisions with animals by allowing more reaction time.

6.2.5 Energy Consumption

The impacts on energy consumption were assessed as: direct, low, short-term, local, and reversible, of moderate likelihood of occurrence and of medium significance. Therefore, in order to reduce energy consumption the following should be applied:

- Equipment should be turned off when not in use.
- Vehicles should not be allowed to remain idle for long periods.
- Recording monthly fuel consumption.

6.2.6 Public and Workers Health and Safety

The impacts on health and safety are assessed as: direct, low, local, short-term, reversible, of medium likelihood of occurrence and of medium significance. Thus, in order to reduce the impacts on health and safety, the following mitigation measures should be applied:

- Ensure that during maintenance all employees utilize appropriate personal protective equipment (e.g. hard hats, steel toe boots, respirators) and are well trained on occupational health and safety.
- Ensure public safety by informing local citizens of the maintenance activities to be performed through the use of media, public announcements, and signage.

6.3 Social Mitigation Measures during Rehabilitation

5.3.2.2.Mitigation Measures on Socio-Economic Conditions of Surrounding Communities

(1) Traffic Disturbance and Nuisance

In order to reduce the impact of traffic disturbance and nuisance on the surrounding communities, the following measures should be implemented:

- Adequate warning, signing, delineation and channeling at least 500 m down and up-gradient from the rehabilitation site must be provided by the project proponents.
- Movement of delivery vehicles outside the site should be restricted to off-peak traffic hours.
- Speed limitation signs should be installed at the access points.
- Full road closures won't be done as all closures will be of partial nature; detours will comprise of merely temporary diversions. In this context, the contractor has to prepare rehabilitation methods and program of work taking into consideration safety and non-stop traffic along the road (refer to Annex 2).
- Commencement works should not be allowed prior to placing all the required temporary signs, traffic lights, flagmen, etc… wherever and whenever required. Typical signs used are those that indicate the presence of a diversion ahead, the end of diversion, in addition to signs indicating there are works ahead, among others.
- The contractor has to ensure access diversions for traffic at each stage of work and to provide all necessary requirements to facilitate the contuity of traffic circulation.

(2) Labor Influx and Labor Induced SEA

Although SEA risks towards women in the surrounding community is anticipated to be low, implementing measure to avoid the risk of SEA is essential.

Avoiding the risk of SEA will ensure that labor uphold acceptable behavioral manners when interacting with local communities. Therefore, in order to avoid the risk of SEA incidents towards female inhabitants of the surrounding communities, the following measures are highly recommended:

- Providing workers with the necessary training and awareness raising session on issues regarding SEA, prior to signing the CoC
- Obliging employees to attend an induction training course prior to commencing work on site to ensure they are familiar with the company's commitments to address GBV, in specific, SEA and the project's CoC.
- Repeating training and awareness raising on a regular basis as new staff commence work on the project.
- Informing laborers regarding national laws that prosecute perpetrators of SEA
- Providing CoC in a language understood by the workers who will sign the CoC.
- Ensuring requirements in CoCs are clearly understood by those signing it.
- Ensuring that the sanctions embodied in the CoC are be clearly explained.
- Ensuring that workers at the rehabilitation site sign the Code of Conduct (CoC) (refer to Annex 3) that targets GBV risks, specifically SEA induced by labor influx, and penalizes the perpetrators of SEA.
- Verifying that GRM (refer to section 8.2.1) is adequately implemented to record complaints from the surrounding communities, to find adequate resolutions and implement corrective actions.

(3) Obstruction of Access Routes to Sensitive Receptors

In order to minimize the temporary obstruction of access routes to residential units, schools, places of worship and hospitals, the contractor should ensure adequate and timely communication with the concerned municipalities and dissemination of project-related work schedule with the surrounding community. In other words, the nearby communities will be informed of the exact timing of activities prior to the commencement of works. Additionally, GRM should be clearly communicated and adequately disseminated.

Further the rehabilitation works should not be performed during peak traffic hours (e.g. works can take place when students are already at school). It is preferable to perform some of the works that are not noisy at night to ensure that access to surrounding schools and residential areas is not hindered. Also, during rehabilitation of long roads, the contractor should work on one small segment at a time, to avoid disturbance of the surrounding sensitive receptors for a long period of time.

5.3.2.3.Mitigation Measures on Socio-Economic Conditions of Labor

(1) Labor Induced SH

Although women participation in rehabilitation works is expected to be low, adequate measures should be addressed to avoid the risk for labor induced SH.

Therefore, laborers should be provided with training sessions and awareness campaigns on SH to ensure that they are aware of issues related to women, social norms and the importance of maintaining and respecting gender equality.

The CoC should be enforced to project laborers (in a language understood by all workers). Additionally, the Contractor should ensure that CoC requirements and sanctions to be applied, if breached, are well understood by signatories, prior to signing the CoC. Further, it is important to ensure that a proper GRM is established to address any kind of violations to the signed CoC.

(2) Child labor

The project should closely monitor the risk of child labor and should have measures in contracts to ensure that those below the working age are not hired and ensure that labor law of Lebanon is followed. In this context, a labor registry and age verification must be maintained during the whole rehabilitation phase. Also, penalty provisions should be available for hiring child labor.

Additionally, during the employment procedure, the contractor or subcontractor should abide by the Lebanese Law No.0 dated 1946.

(3) Inadequate Labor Conditions

Safety and protection of workers should be ensured within the contracts provided by the contractor and continuous monitoring is required to maintain adequate labor conditions. Further, in order to counter inadequate working circumstances that would make both Syrian and low-skilled Lebanese worker at higher risk of exploitation, appropriate rules and regulations should be implemented in order to ensure the protection of laborers.

Contractors should be forced to abide by the specified Lebanese law determining the minimum wage and minimum working age for children, as per the law, and to comply with, working conditions and hours (as specified in the legal section). Further, the Contractor must comply with Decision 29/1 dated 2018 which restricts significant number of jobs to Lebanese only and allows Syrians to occupy jobs that are not restricted to Lebanese.

(4) Social tensions and conflict over job-sharing and dissatisfaction with allocation of project-generated jobs.

Clear criteria for job selection and allocation should be adopted accounting for the ratio of Syrian and Lebanese community workers in Jbeil Caza and types of positions available. Moreover, it is important to avoid competition between Syrian workforce willing to accept lower wages and skilled Lebanese labor. Hence, the Contractor should ensure a fair allocation of job opportunities, and most importantly non-discrimination and fair treatment (such as equal contractual wages/benefits and working conditions) should be ensured among workers. In this context, clear communication with all affected workers and a robust GRM are essential to mitigate the potential risk of social tensions or dissatisfaction among Syrian and Lebanese workers.

(5) Under-participation or underemployment or discrimination of women

The following measures should be adopted to ensure women employment by the Contractor:

- Setting minimum percentage of women at the employment phase.
- The project should ensure that gender equality is attained when it comes to recruitment, salary levels and others
- Promoting the employment of females in appropriate jobs such as managerial or administrative positions and giving the opportunity to women to decide the suitable operations that they can perform
- Encouraging women through awareness campaigns on the importance of employment in such project in order to enhance their livelihoods.

6.4 Social Mitigation Measures during Operation

Rehabilitation works under RAP will lead to positive social impacts due to improvement in road conditions such as lighting. This will increase visibility which will contribute to safer environment for women and reduce the probability of SEA.However, some measures are necessary to ensure that positive impacts are maximized. These measures include the following:

- Ensure that workers during the maintenance phase are trained and well understood prior to signing the CoC that targets GBV risks (mainly SEA and SH) and penalizes the perpetrators of GBV.
- Ensure that GRM mechanism is functional to receive any public concerns throughout this phase and to address the received complaints within the set timeframes (specified in section 8.2).

7. Environmental and Social Management and Monitoring Plans

Environmental and social management and monitoring are essential to ensure that the identified impacts are maintained within the allowable levels, unanticipated impacts are mitigated at an early stage, and the expected project benefits are realized. Thus, the main aim is to assist in the systematic and prompt recognition of problems, encouraging effective preventive and mitigation measures and ultimately achieving the goal of good environmental and social performance. A sound understanding of environmental priorities and policies, properly managing the project, acknowledging the regulatory requirements and keeping updated operational information are fundamental to ensure the effective and satisfactory environmental performance.

7.1 Institutional Setup and Capacity Building

The project works will be executed on the main road network which is under the jurisdiction of the MoPWT. In Lebanon, donor-funded road works projects are implemented by CDR upon the request of the Council of Ministers (CoM). Therefore, in the context of REP project, CDR (Road and Transport Department) will execute the project on behalf of the Government/MoPWT.

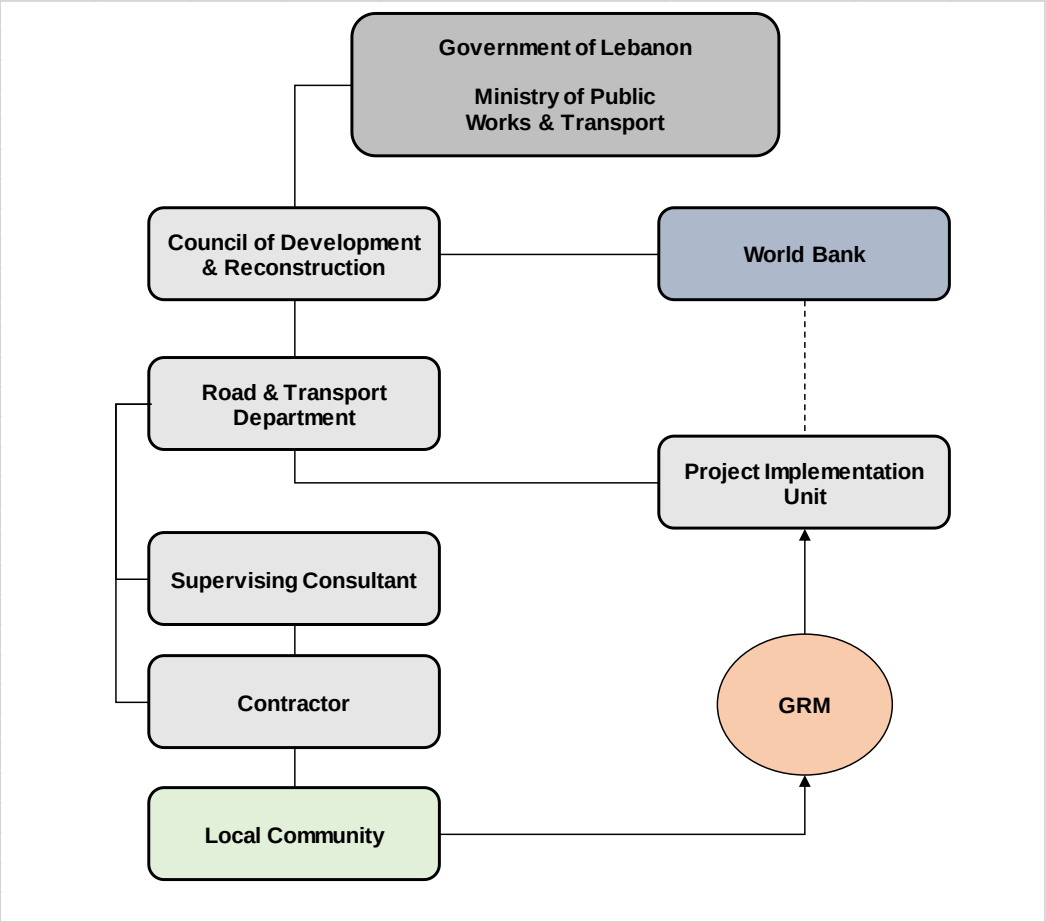
In order to achieve proper environmental management and monitoring, a clear, functional institutional structure was defined (refer to Figure 7-1). During the rehabilitation phase, the contractor would be the primary actor; ensuring compliance of works with the different items specified in the environmental and social management plan. Accordingly, the contractor will be supervised by several entities appointed by CDR. CDR will be responsible for constant monitoring of the rehabilitation works through weekly and/or monthly reports (sent by the contractor) and site visits, ensuring and enforcing mitigation measures.

More specifically, the CDR will develop a Project Implementation Unit (PIU) dedicated to the project, which includes social and environmental specialists to monitor and evaluate the project. Moreover, it will engage a supervising consultant to directly monitor the contractor. In this context, planning, implementation and supervision of environmental safeguards will thus take place at different stages (a) PIU, (b) Supervising Consultant, and (c) Contractor.

PIU will be responsible for providing the overall plan direction, technical support, appraisal and validation of environmental and social management plans, and monitoring of environmental compliance and progress reporting to the World Bank. The responsibility of implementation and management of environmental/social safeguards by the PIU will be coupled with the assignment of supervising consultant (focal point(s) for environmental and social safeguards) who will be in charge of ensuring sound application of the ESMP. Finally, implementation of the ESMPs will mainly be the Supervising Engineer duty and consequently the Supervising Engineer will have to appoint qualified environmental, health and safety consultant and a social development consultant in order to ensure that the Contractor is compliant with the ESMPs during the rehabilitation phase of the project.

The main concerned municipalities will be involved in managing and communicating citizen's potential complaints to the CDR (PIU).

Figure 7-1 Institutional setup



7.1.1 Training

Despite the institutions' previous experiences in implementing similar projects, institutional capacity development would be beneficial to ensure proper implementation and supervision of the suggested mitigation measures and monitoring program. For instance, human resources can be improved through training and regular follow-up.

In order to ensure safeguard procedure, instruments and monitoring needs of the REP are well understood by the contractor staff, CDR (i.e. the supervising consultant) will provide trainings. Trainings will aim to familiarize the contractor's staff on the following guidelines and instruments:

- World Bank's safeguard policies;
- National environmental regulations (the main social and environmental legal texts listed in the legal section of this ESMP)
- Safeguards planning, management and monitoring requirements of the REP as specified in the ESMP;
- GRM

7.2 Mitigation Plans

Tables 7-1 and 7-2 below present the Environmental and Social Management Plans during Rehabilitation and Operation Phases.

7.2.1 Environmental and Social Mitigation Plans

Table 7-1 Environmental Management Plan in Rehabilitation Phase

Source of Impact	Project Activities	Proposed Mitigation Measures	Responsibility	Cost Estimation (USD)
Emission				
Air Emissions/Odors	Generation of dusts, exhaust gases, and odors from pavement reconstruction and others activities	• Ensuring maintenance of all construction equipment regularly, at least once a month. • Machinery and equipment should be equipped with air pollution control equipment that should be monitored regularly to ensure its effective operation. • Avoiding idling time of machinery. • Ensuring regular maintenance of vehicles.	Project contractors / consultant	Included in the rehabilitation Cost
Acoustic Environment	Construction equipment noise and vibrations, earth manipulating activities from pavement milling and drainage excavations	• Applying an appropriate schedule for maintenance activities, for instance, from 8 am to 4 pm in order to avoid any works that may cause noise and vibration during nighttime. • Nighttime activities should be done using noise reducing means or low-noise technologies. • Using vehicles and equipment that meet national standards for noise and vibration. • Regular maintenance of the machinery, equipment and vehicle should be carried out to prevent excessive noise. • Publishing and registering allowed working time of construction machines with local authorities and ensuring strict compliance with set times. • Restricting the use of noisy machines and/or adopting noise-reducing means (silencers) for construction machines, especially near sensitive areas.	Project contractors / consultant	Included in the rehabilitation Cost
Solid Waste ad Wastewater Generation	Generation of construction wastes and domestic-like wastes	• Good site practices including the effective disposal of all wastes generated on-site should be adopted. • The generated waste onsite should be properly segregated at source into recyclables and organic waste in appropriately labelled waste bins. Sorting at source of domestic and general waste should be implemented. • Sufficient waste disposal points must be provided and regular collection for disposal must take place near the road.	Project contractors / consultant	Included in the rehabilitation Cost

		• Adequate bins for collection and storage of waste materials should be provided. • Prevent the overfilling of the waste containers. • Domestic-like waste shall be removed daily from the site. • Excavated soil should be stored and transported offsite to the nearest licensed dumpsite "Hbaline dumpsite"due to possible heavy metal contamination. • Any excavated unsuitable material should be removed from site within 24 hours. Reuse of contaminated soil material is prohibited and random disposal of this material in open abandoned areas is never allowed. • In case of linking the portacabin toilet to a polyethylene storage tank, the following should be done: o A specialized contractor should be selected to periodically collect the wastewater from the polyethylene tank. o The supervising consultant should inspect it regularly to check for any leakages and to ensure that the generated wastewater is properly collected before it's full.		
Accidental Releases	Accidental spills of construction materials, and storm water runoff	Control of Accidental Spills • All refueling operations shall take place off-site, vehicles should be fueled up before arriving to the road section • A spill response plan shall be in place and all workers should be trained on its implementation. Control of Stormwater Runoff • In case of temporary storage of excavated materials, accidental contamination or spills of the removed soil should be avoided to limit contamination of storm water runoff and in turn the surrounding streams. • Any stockpiled construction material should be covered with an impermeable layer to avoid contamination of stormwater runoff.	Project contractors / consultant	Included in the rehabilitation Cost
Soil Manipulation	Soil erosion and sedimentation from drainage or sidewalks excavations	• 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	Project contractors / consultant	Included in the rehabilitation Cost

		• Placement of geotextile silt traps as appropriate, especially in areas close to water bodies (when Jbeil R3 and Jbeil R4 are in close proximity to Wadi Mouhnane River and Wadi Baachta River respectively.		
Existing Infrastructure	Interference of pavement drilling and milling with infrastructure	• Prepare procedures for rapid notification to the concerned Municipality or public entity and assistance with re-instatement, in the event of any disruption of public utilities. • Splitting works into the road segments will be done to ensure quick progression through road while causing minimal disruption to traffic.	Project contractors / consultant	Included in the rehabilitation Cost
Resources Consumption	Increase energy demand	• Ensuring that equipment that are not in use are turned off. • Conducting regular maintenance and efficient operation of machinery. • Vehicles should not be allowed to remain idle for long periods. • Recording monthly fuel consumption.	Project contractors / consultant	Included in the rehabilitation Cost
Biological Resources	Changes in natural habitat and biodiversity	• Rehabilitation activities must not take place during the two migration seasons for birds (generally, early-September late May, mid March-early May) in order to avoid disturbing passenger birds, if feasible; • A waste management plan must be taken to avoid contaminating the soil and water • Workers should be instructed to protect flora and fauna when feasible as well as their habitats; • Solid waste, rehabilitation debris should not be dumped into the natural habitat (namely the dense valley in El-Mouncef (JbeilR4) and BNR (JbeilR3)). • Restricting the use of noisy machines and/or adopting noise-reducing means (silencers) for construction machines, especially near sensitive areas (dense woodland in Monsef (Jbeil R4), and near BNR (Jbeil R3) • Washing of vehicles and machinery should be done offsite and away from particular biotopes (wooded lands and riparian ecosystems); • Green lights are recommended (when additional lighting is deemed necessary during the rehabilitation phase) for the road segments that are bordered by dense woodlands • Road cross-section must be fixed during the rehabilitation phase to reduce the impact on biodiversity, for example, by flattening side slopes. This makes crossing easier for animals that find roads a physical barrier (WB). Also, providing longer sight lines for drivers is recommended as it can reduce collisions with animals by allowing more reaction time.	Project contractors / consultant	Included in the rehabilitation Cost

Visual intrusion	Day time and night time rehabilitation works	• Covering of temporary stockpiled excavations on the side of the road • Ensuring that the light source is the minimum intensity for the required purpose; • Ensuring that lights are turned off by timer or manually when they are not needed; • Ensuring that fittings are chosen that direct light accurately to where it is needed; • Ensuring that the type of light chosen is the least likely to cause light pollution;	Project contractors / consultant	Included in the rehabilitation Cost
Social Risks	• Labor influx and Labor-induced SH and SEA • Workers tension (Syrian/Lebanese ratio) • Child labor • Inadequate labor conditions • Traffic disturbance • Obstruction of Access Routes to Sensitive Receptors	**Socio-Economic Conditions of Surrounding Communities** <u>Traffic Disturbance and Nuisance</u> • Adequate warning, signing, delineation and channeling at least 500 m down and up-gradient from the rehabilitation site must be provided by the project proponents. • Movement of delivery vehicles outside the site should be restricted to off-peak traffic hours. • Speed limitation signs should be installed at the access points. • Full road closures won't be done as all closures will be of partial nature; detours will comprise of merely temporary diversions. In this context, the contractor has to prepare rehabilitation methods and program of work taking into consideration safety and non-stop traffic along the road (refer to Annex 2) • Commencement of works should not be allowed prior to placing all the required temporary signs, traffic lights, flagmen, etc… wherever and whenever required. Typical signs used are those that indicate the presence of a diversion ahead, the end of diversion, in addition to signs indicating there are works ahead, among others. • The contractor has to ensure access diversions for traffic at each stage of work and to provide all necessary requirements to facilitate the continuity of traffic circulation. <u>Labor Influx and Labor Induced SEA</u> • Providing workers with the necessary training and awareness raising session on issues regarding SEA, prior to signing the CoC	Project contractors / consultant	Included in the rehabilitation Cost

		• Obliging employees to attend an induction training course prior to commencing work on site to ensure they are familiar with the company's commitments to address GBV, in specific, SEA and the project's CoC. • Repeating training and awareness raising on a regular basis as new staff commence work on the project. • Informing laborers regarding national laws that prosecute perpetrators of SEA • Providing CoC in a language understood by the workers who will sign the CoC. • Ensuring requirements in CoCs are clearly understood by those signing it. • Ensuring that sanctions embodied in the CoC are be clearly explained. • Ensuring that workers at the rehabilitation site sign the Code of Conduct (CoC) (refer to Annex 3) that targets GBV risks, specifically SEA induced by labor influx, and penalizes the perpetrators of SEA. • Verifying that GRM is adequately implemented to record complaints from the surrounding communities, to find adequate resolutions and implement corrective actions. <u>Obstruction of Access Routes to Sensitive Receptors</u> • In order to minimize the temporary obstruction of access routes to residential units, schools, places of worship and hospitals, the contractor should ensure adequate and timely communication with the concerned municipalities and dissemination of project-related work schedule with the surrounding community. • Nearby communities should be informed of the exact timing of activities prior to the commencement of works. • The rehabilitation works should not be performed during peak traffic hours (e.g. works can take place when students are already at school). • It is preferable to perform some of the works that are not noisy at night to ensure that access to surrounding schools and residential areas is not hindered. • During rehabilitation of long roads, the contractor should work on one small segment at a time, to avoid disturbance of the surrounding sensitive receptors for a long period of time.		

		Socio-Economic Conditions of Labor <u>Labor Induced SH</u> • Laborers should be provided with training sessions and awareness campaigns on SH • CoC should be enforced to project laborers (in a language understood by all workers). • The Contractor should ensure that CoC requirements and sanctions to be applied, if breached, are well understood by signatories, prior to signing the CoC. • The Contractor should ensure that a proper GRM is established to address any kind of violations to the signed CoC. <u>Child Labor</u> • The project should closely monitor the risk of child labor and should have measures in contracts to ensure that those below the working age are not hired and ensure that labor law of Lebanon is followed. • Labor registry and age verification must be maintained during the whole rehabilitation phase. • Penalty provisions should be available for hiring child labor. • During the employment procedure, the contractor or subcontractor should abide by the Lebanese Law No.0 dated 1946. <u>Inadequate Labor Conditions</u> • Safety and protection of workers should be ensured within the contracts provided by the contractor • Continuous monitoring is required to maintain adequate labor conditions. • Appropriate rules and regulations should be implemented in order to ensure the protection of laborers. • Contractors should be forced to abide by the specified Lebanese law determining the minimum wage and minimum working age for children.		

		• Contractor must comply with Decision 29/1 dated 2018 which restricts significant number of jobs to Lebanese only and allows Syrians to occupy jobs that are not restricted to Lebanese. <u>Social tensions and conflict over job-sharing and dissatisfaction with allocation of project-generated jobs.</u> • Clear criteria for job selection and allocation should be adopted accounting for the ratio of Syrian and Lebanese community workers in Jbeil Caza and types of positions available. • It is important to avoid competition between Syrian workforce willing to accept lower wages and skilled Lebanese labor. • The Contractor should ensure a fair allocation of job opportunities, and most importantly non-discrimination and fair treatment should be ensured among workers. (such as equal contractual wages/benefits and working conditions) should be also ensured among workers. • Clear communication with all affected workers and a robust GRM are essential to mitigate the potential risk of social tensions or dissatisfaction among Syrian and Lebanese workers. <u>Under-participation or underemployment or discrimination of women</u> • Setting minimum percentage of women at the employment phase. • The project should ensure that gender equality is attained when it comes to recruitment, salary levels and others • Promoting the employment of females in appropriate jobs such as managerial or administrative positions and giving the opportunity to women to decide the suitable operations that they can perform • Encouraging women through awareness campaigns on the importance of employment in such project in order to enhance their livelihoods.		
Occupational Health and Safety Hazards	Rehabilitation activities	Specific measures according to IFC (2007) to limit impacts due to the open nature of rehabilitation sites and their proximity to the community include: • Measures to prevent unauthorized access to dangerous areas should be in place	Project contractors / consultant	Included in the rehabilitation Cost

		• Openings should be sealed by gates or removable chains • Fall prevention and protection measures should be implemented, such as the installation of guardrails with mid-rails and toe boards at the edge of any fall hazard area • Signage should be in accordance with international standards and be well known to, and easily understood by workers, visitors and the general public as appropriate • Marking all energized electrical devices and lines with warning signs • Establishing rights-of-way, site speed limits, vehicle inspection requirements, operating rules and procedures, and control of traffic patterns or direction Training of Personnel The following trainings should be implemented (Muiruri & Mulinge, 2014): • Ensure that all workers are given proper site-specific instructions on occupational health and safety prior to commencing work. • The Occupational Health and Safety training should consist of hazard awareness and control measures. • The training should ensure proper usage of personal protective equipment (PPE). • The trainees should acquire knowledge of emergency procedures and preventive actions. • Refresher training should be provided periodically, if skills are not frequently used. Noise Emissions According to IFC (2007), the following should be implemented: • Employees should not be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. • Another way of protection can be achieved through limiting the duration of noise exposure. For instance, for every 3 dB (A) increase in sound levels, the allowed exposure period should be reduced by 50 percent.		

		• Periodic medical hearing checks should be performed on employees who are exposed to high noise levels. Health and Safety Signs Examples of signs that must be present at the rehabilitation site include but are not limited to the following (DOLIDAR, 2017): • Wear safety helmets and reflective jackets • Permit to work areas • Falling Hazard, Use safety belt • Watch for moving equipment • Wear safety footwear • Wear hearing protection • Wear eye protection • First aid • Danger of electricity • No smoking • Work in progress • Stop and go First Aid and Injuries The availability of first aid kits and the adoption of the following recommendations is essential in order to respond quickly and efficiently to any accident or injury: • At least one laborer per each group of workers onsite should be appointed to respond to emergency cases, on condition that adequate first aid training is provided. • One employee for every 25 employees on site should be trained in first aid. The assigned personnel should be provided with appropriate identification, including a red hard hat with a white "red cross" symbol and an identification badge (CDR, 2007). • All workers onsite should know where the first aid facilities are located and how to adequately use first aid kits. • A full list of nearby hospitals, medical centers and emergency contact numbers should be provided to workers onsite. • All injuries or accidents at the rehabilitation site should be reported		

		immediately and the contractor should maintain and keep a record of accidents or illnesses. • Turning off or disconnecting machinery with exposed moving parts. • Marking all energized electrical devices and lines with warning signs. • Checking all electrical cords, cables and hand power tools for frayed and exposed cords and following manufacture recommendations for maximum permitted operational voltage. • Use mechanical assists to eliminate or reduce exertions required to lift heavy material, hold tools and work objects. Personal Protective Equipment (PPE) Proper use of PPEs is essential to limit the occurrence of occupational hazards. Accordingly, the following should be implemented (DOLIDAR, 2017): • An adequate supply of suitable personnel protective equipment (PPE) such as hard hats, safety boots, reflective jackets, and others should be maintained. • The PPEs (specifically hard hat and reflective jacket) provided to managers and safety officers should have a different color than the PPEs of the rehabilitation workers onsite. • Ensure that workers wear PPEs all the time during working hours. The following PPE should be used when handling and working with asphalt (NIOSH, 2003): • Wearing thermally-insulated gloves to keep asphalt from burning or irritating the skin. • Wearing long-sleeve shirts and long pants without cuffs and keeping the sleeves rolled down and close to the collar. • Wearing Steel-toed safety shoes. • Wearing a face shield, not just safety glasses. The following mitigation measures should be adopted by labor when handling and working with asphalt (NIOSH, 2003): • Never stick your head in an asphalt tank or mixing container.		

		• Never lean over a kettle. Stay upwind from asphalt if possible. • Enclosing mixing and stirring operations. • Stop what you're doing if you notice symptoms. Ask your foreman for advice. • Keep asphalt off your skin and out of your eyes. • If you do get asphalt in your eyes, flush with water for 15 minutes. • Eating, drinking and smoking are prohibited during any asphalt activity.		
Public Health and Safety	Rehabilitation activities	**Site Layout and Planning** • Designing carefully the rehabilitation site in order to avoid or reduce accidents due to trips, slips, and collisions • Providing roads within the zones being rehabilitated with speed limits signs of 25 km/hr to decrease risks of collisions and accidents. • Restricting access to the zones of unfinished works and providing guards to control entrances and exits. • No work activities are to be conducted without the presence of barriers, temporary traffic lights, and flagmen if necessary, which are required to warn the public of the existing rehabilitation site and its activities **Traffic Diversion** • Exact locations and distances of detours are to be set by the site engineer. These points are set according to work progress, location and traffic. Moreover, illustrated detour signage should be displayed around the site as necessary. In addition, the approximate location of signs is shown on the drawings (Annex 2). Exact locations are to be determined on site upon engineer's approval. • The contractor has to ensure access diversions for traffic at each stage of work and to provide all necessary requirements to facilitate the continuity of traffic circulation. • Prior to any works, the contractor shall submit to the engineer a detailed method statement showing and describing the following: o The division of the works into phases and sections	Project contractors / consultant	Included in the rehabilitation Cost

		○ The various traffic diversions related to each phase of the works. ○ The temporary diversion of the different services and utilities (avoid continuous disturbance). • Adequate warning signs and security of the site, namely through barriers, should be provided during non-working hours. • Where the pavement crosses service entrance (houses or shops) which are higher or lower than the pavement edge level, the contractor has to construct concrete steps as directed by the engineer on site. Steps are constructed wherever the difference in elevation between the entrance and pavement levels are more than 250 mm. • In case where the pavement edge limit crosses a parking or a pedestrian footpath, depressed sidewalk curb shall be applied as shown on drawings (Annex 2) and directed by the engineer. **Noise Emissions** • Noise levels should be maintained within the national permissible limits (presented in Table 2-4) and limited to working hours as allowed by obtained permits. Transportation of construction material during regular working hours should be minimized, when possible.		

Table 7-2 Environmental Management Plan in Operation Phase

Source of Impact	Project Activities	Mitigation Measures	Responsibility	Cost Estimation (USD)
Emission				

Air Emissions	Dust and exhaust emissions	• Ensuring maintenance of equipment used in road maintenance activities (eg. Shovel, steel roller, excavator) regularly, at least once a month. • Machinery and equipment should be equipped with air pollution control equipment that should be monitored regularly to ensure its effective operation. • Avoiding idling time of machinery. • Using dust-suppression methods to reduce emission of particulate matter into the surroundings. • Prohibit dust-generating activities during excessively windy periods. • Vehicle maximum speed limit in work zones should be decreased to 25 km/hr.	Project contractors / consultant	Included in the rehabilitation Cost
Acoustic pollution	Vehicle and equipment noise from maintenance activity	• Applying an appropriate schedule for maintenance activities, for instance, from 8 am to 4 pm in order to avoid any works that may cause noise and vibration during nighttime. • Nighttime activities should be done using noise reducing means or low-noise technologies.	• Contractor during the first year • Municipalities and MoPWT after the one-year period	Secured by responsible party
Solid waste and Wastewater Generation	Accidental spills and Generated domestic solid waste and wastewater during maintenance	• All refueling and maintenance operations shall take place off-site, vehicles should be fueled up before arriving to the road section • A spill response plan shall be in place and all workers should be trained on its implementation. • Provision of adequate bins for collection and storage of waste material including litterbins and waste skips • Preventing the overfilling of the waste containers placed on the road • Proper disposal of any generated wastewater during maintenance activities	• Contractor during the first year • Municipalities and MoPWT after the one-year period	Secured by responsible party
Depletion of Resources				

Biological Resources	Light and noise pollution – negative effect on biodiversity (fauna and flora)	• When conducting maintenance activities, a waste management plan must be set to avoid contaminating the nearby streams and affecting the local biodiversity. Moreover, restricting the use of noisy machines, especially near sensitive areas (wooded lands and riparian habitats) • Install silencers to the maintenance machines • Light pollution will increase as lighting poles will be fixed, however, if green lights are to be used, the local fauna will be less disturbed (namely for the road segments that are bordered by dense woodlands (namely the case of El-Mouncef area, Jbeil R4) and for Jbeil R3 where BNR is only 1 Km away). • Road cross-section must be fixed during the rehabilitation phase to reduce the impact on biodiversity when roads are operational, for example, by flattening side slopes. This makes crossing easier for animals that find roads a physical barrier (WB). Also, providing longer sight lines for drivers is recommended as it can reduce collisions with animals by allowing more reaction time.	• Contractor during the first year Municipalities and MoPWT after the one-year period	Secured by responsible party
Resources Consumption	Energy Consumption	• Equipment should be turned off when not in use. • Vehicles should not be allowed to remain idle for long periods. • Recording monthly fuel consumption.	• Contractor during the first year • Municipalities and MoPWT after the one-year period	Included in the Construction Cost
Other Impacts				
Health and Safety Hazards	Maintenance related accidents	• Ensure that during maintenance all employees utilize appropriate personal protective equipment (e.g. hard hats, steel toe boots, respirators) and are well trained on occupational health and safety. • Ensure public safety by informing local citizens of the maintenance activities to be performed provided through the use of media, public announcements, and signage • Signage should be in accordance with international standards and be well known to, and easily understood by workers, visitors and the general public as appropriate • Marking all energized electrical devices and lines with warning signs • Establishing rights-of-way, site speed limits, vehicle inspection requirements, operating rules and procedures, and control of traffic patterns or direction	• Contractor during the first year • Municipalities and MoPWT after the one-year period	Secured by responsible party

		• Ensure that all workers are given proper site-specific instructions on occupational health and safety prior to commencing work. • The Occupational Health and Safety training should consist of hazard awareness and control measures. • The training should ensure proper usage of personal protective equipment (PPE).		
Social	GBV risks and public complaints	• Ensure that workers during the maintenance phase sign the CoC that targets GBV risks and penalizes the perpetrators of GBV. • Ensure that GRM mechanism is functional to receive any public concerns throughout this phase and to address the received complaints within the set timeframe (specified in section 8.2)	• Contractor during the first year • Municipalities and MoPWT after the one-year period	Secured by responsible party

7.3 Monitoring Plan

Environmental and social monitoring is one of the most important parts of an efficient and coherent operation of a project. All environmental and social requirements and restrictions from authorities, project owners and local communities are interlinked and form the primary reference for monitoring and evaluation. In other words, monitoring aims to ensure that all project activities undertaken are environmentally and socially sound, while considering the mitigation measures discussed in the previous section.

It does so by defining a clear set of measurable indicators in an attempt to properly evaluate the project's performance from both an environmental and a social aspect. These indicators, also known as Key Performance Indicators (KPIs), can then be used to assess the project's implementation in a timely manner. Consequently, they assist in the early detection of any deviations from the project's goals. It is important to note that the assessment of all proposed measures is vital to ensure their proper implementation and the optimal operation of the project.

This allows the involved parties to take any corrective measures and limit any unsatisfactory performance if such a case arises. It also allows them to accurately communicate the performance of the project with regulators, the public, or other stakeholders.

Monitoring involves the observation, review, and assessment of onsite activities (including parameters) to ensure adherence to regulatory standards and the suggestions made to lessen negative impacts.

7.3.1 Monitoring Plan Implementation

Contractors shall employ qualified environmental and health officers/inspectors responsible for monitoring project activities. Their aim is to ensure that the proposed activities, including the suggested mitigation measures, are properly implemented during the rehabilitation phase. The relevant ministries would also be expected to follow up, if deemed necessary, on the proper implementation and abidance by the relevant laws and regulations.

Monitoring during the operational phase is mainly the responsibility of CDR and any concerned local authorities, namely the relevant municipalities.

The KPIs for this project are listed in Table 7-3.

Table 7-3 Key performance indicators for the monitoring plan

Parameter	Standard/Indicator	Phase
Air quality	Lebanese Stack Emission Standards Lebanese Exhaust Emissions Standards for Vehicles	Rehabilitation and post rehabilitation phase
Occupational health and safety	Number of accidents and working days lost Health and Safety Guidelines Compliance with Lebanese Labor Law	
Public safety	Number of accidents involving public safety	
Noise levels	Lebanese Noise Emission Limits for Outdoor Areas	
Soil and water quality	Compliance with Lebanese Standards for the Discharge of wastewater to sewage network/ surface water	

Others	Labor age, labor wage, percentage of women in labor, work injuries, code of conduct trainings, number of grievances (internal and/or external)	

The monitoring requirements associated with the management strategies which should be implemented during rehabilitation and operation are outlined in Table 7-4 and Table 7-5.

Table 7-4 Environmental Monitoring Plan in Rehabilitation Phase

Impact	Parameters to Monitor	Frequency	Monitoring Location	Monitoring Method	Standard/Guidelines National/International	Monitoring Responsibility	Institutional Follow-up	Approximate Cost (USD/year)
Emissions								
Air Emissions/GHG/Dust	PM2.5-10, SO_x, NOx, O_3, CO, Total Suspended Particles (TSP)	Testing once during the project life and weekly inspection	• Construction vehicles exhaust • Around rehabilitation site for dust	• Single point sampling (at one quarter the diameter across the stack/source) • Visual opacity measurement (smoke inspection)	Particulate Matter ($PM_{<10}$) 80 µg/m^3 Sulfur dioxide (SO_2) 120 µg/m^3 Nitrogen dioxide (NO_2) 150 µg/m^3	Supervising Consultant	CDR (PIU)	104,000 (2000 per test)
Noise	Noise Levels (Lmin, Lmax, and Leq)	Monthly during noisy operation	Around the rehabilitation site, especially near loud machinery and major rehabilitation activities	One sample per location (near sensitive receptors)	Refer to Table 2-6	Supervising Consultant	CDR (PIU)	Included in rehabilitation Cost
WW Generation	pH, Temperature: max, BOD, COD, Sulfate, Fecal Coliform, Total Coliform, Suspended solids, Oil and grease	Before commencement of work and bi-annually	Sediment trap at downstream assigned for contaminated stormwater runoff	Two samples at effluent of chosen sediment trap	pH: 6-9 Temperature: max 30 °C BOD: 25 mg/L COD: 125 mg/L Sulfate: 1 mg/L Fecal Coliform: 0 CFU/100ml Total Coliform: 0CFU/100ml at 37^0C Suspended solids: 60 mg/L Oil and grease: 50 mg/L	Supervising Consultant	CDR (PIU)	600

Impact	Parameters to Monitor	Frequency	Monitoring Location	Monitoring Method	Standard/Guidelines National/International	Monitoring Responsibility	Institutional Follow-up	Approximate Cost (USD/year)
	Domestic-like wastewater	Daily	Polyethylene storage tank (in case portacabin toilet is not linked to WW network)	Visual inspection	• Prohibit leaks from tank • Prohibit overfilling of tank	Supervising Consultant	CDR (PIU)	Included in rehabilitation Cost
Accidental Releases	Number of spills/leaks (of lubricants, oil, fuel, or other chemicals)	Weekly	Around the rehabilitation site, especially near equipment, material, and storage tanks	Visual inspection	N.A.	Supervising Consultant	CDR (PIU)	Included in rehabilitation Cost
Depletion of Resources								
Energy Resources	Fuel consumption rates	Monthly	At fuel storage tanks area	Respective to fuel consumed	N.A	Supervising Consultant	CDR (PIU)	Included in rehabilitation Cost
Biological Resources	Ecological audit for particular biotopes	Weekly	Riparian habitats near water channels and streams	Samples and photos per location and GPS point	N.A	Supervising Consultant	CDR (PIU)	Included in rehabilitation Cost
Socio-Economic								
GBV	• Code of conduct trainings • Signed forms • Dates of training	Bi-annually	At training locations	Respective to the amounts of trainings conducted	N.A.	Supervising Consultant	CDR (PIU)	Included in rehabilitation Cost
	• GBV-related internal grievances	Monthly	At each rehabilitation zone	Received complaints and GRM records	N.A.	Supervising Consultant	CDR (PIU)	Included in rehabilitation Cost
OHS	• Total number of work injuries • OHS-related internal grievances	Continuously	At each rehabilitation zone	Visual inspection Employee records	N.A.	Supervising Consultant	CDR (PIU)	Included in rehabilitation Cost

Impact	Parameters to Monitor	Frequency	Monitoring Location	Monitoring Method	Standard/Guidelines National/International	Monitoring Responsibility	Institutional Follow-up	Approximate Cost (USD/year)
	• OHS-related trainings							
	• Visual field inspections • Verbal complaints by workers • Ensure use of PPE	Continuously	Around rehabilitation site and used roads	Continuous visual inspection	N.A	Supervising Consultant	CDR (PIU)	Included in rehabilitation Cost
Social Tensions and Conflicts over Job-Sharing	• Number of related grievances • Percentage of workers (based on gender, nationality)	Monthly	• Around the rehabilitation sites • Employee records	Received complaints and records	N.A.	Supervising Consultant	CDR (PIU)	-
Obstructing Access to Amenities	Type, location, and duration of amenity to which access was obstructed	Daily	At rehabilitation sites	Visual inspection	N.A.	Supervising Consultant	CDR (PIU)	Included in rehabilitation Cost
Working conditions	Labor's wages	Monthly	Laborers' contracts	Workers complaints records Labor law verification	N.A.	Supervising Consultant	CDR (PIU)	-
Child labor	Labor's age	Monthly	Laborers' records/ files	Labor registry and age verification Labor law verification	N.A.	Supervising Consultant	CDR (PIU)	-
Underemployment of Women	Percentage of female employees in workforce	Bi-annually	Laborers' records/ files	Labor registry	N.A.	Supervising Consultant	CDR (PIU	-

Impact	Parameters to Monitor	Frequency	Monitoring Location	Monitoring Method	Standard/Guidelines National/International	Monitoring Responsibility	Institutional Follow-up	Approximate Cost (USD/year)
Other Grievances	• Internal and external grievance reports	Weekly or upon grievance occurrence	At each rehabilitation zone	Complaints records	N.A.	Supervising Consultant	CDR (PIU	Included in rehabilitation Cost
Other Impacts								
Visual intrusion	Dust pollution (opacity)	Daily	At dust generating activities	Several photographs per location + opacity measurement	N.A	Supervising Consultant	CDR (PIU)	Included in rehabilitation Cost
Damage to existing infrastructure	Type, size, and number of damaged infrastructure entities	Daily	Around the rehabilitation site.	Visual inspection	N.A.	Supervising Consultant	CDR (PIU)	-

Table 7-5 Environmental Monitoring Plan in Operation Phase

Impacts	Parameters to Monitor	Frequency	Monitoring Location	Monitoring Method	Standard/Guidelines National/International	Institutional Followup	Approximate Cost (USD/year)
Emissions							
Noise	Noise Levels (Lmin, Lmax, and Leq)	Bi-annually or upon complaints	Along the two concerned roads near sensitive receptors and complainers	One sample per location	Refer to Table 2-6	CDR	Included in rehabilitation Cost
WW Generation	Leakages, spillages, improper discharges, etc.	Annually	Upon maintenance routine, at wastewater piping system	Visual Inspection	N.A.	CDR	Included in rehabilitation Cost
Other Impacts							
Social Satisfaction	External complaints or grievances	Bi-annually or upon complaints	Along the two concerned roads	Received complaints and records	N.A.	CDR	Included in rehabilitation Cost
Road Safety	Accidents: number, dates, frequency, and causes	Annually	Along the two concerned roads	Visual inspection (of accident logs containing the mentioned data)	N.A.	CDR	Included in rehabilitation Cost

7.3.2 Documentation and Reporting

Monitoring yields lots of data regarding project performance. As a result, proper documentation is necessary for two reasons: first to prepare and send performance reports to the concerned parties and second to analyze the acquired data and implement changes when necessary.
In this context, monitoring reports will take place as described below.

- Contractor's Health and Safety officers submit compliance reports to the Environmental Supervision Consultants on a monthly basis.
- The Environmental Supervision Consultants review and approve contractor reports and submit them to PIU on a monthly basis.
- PIU submits environmental/social progress as part of their quarterly project progress reports to the WB on a quarterly basis.

In case of severe incidents (e.g. fatality on site) immediate reporting within 24 hours to CDR and within 48 hours to the WB must be done.

7.3.3 Guidelines for Health and Safety Plan during Rehabilitation

An effective Occupational Health and Safety Plan, in line with World Bank guidelines, for rehabilitation should be submitted by the Contractor and approved by the appointed supervising Consultant prior commencement of works. The plan should include at least the following components:

- Proper signage in and around the sites (local language to be understood by all);
- Fire response and spill response measures;
- Proper storage and signage of materials including Material Safety Data Sheets;
- Safety measures according to type of equipment;
- Train workers on lifting and material handling techniques;
- Plan work site layout to reduce the need for manual transfer of heavy objects,
- Personal safety equipment;
- Medical services which includes first aid kits;
- Mobile sanitary facilities;
- Internal GRM for workers
- Safe drinking water in accordance with regulations.

In addition, the plan should also incorporate all of the previously mentioned measures stated in section **Error! Reference source not found.** which addresses in great detail OHS and PHS m easures. All rehabilitation staff should be trained on the Health & Safety Plan and the specific safety measures related to their own activities.

8. Consultation, Disclosure and GRM

8.1 Public Consultation

Project-affected groups, mainly municipalities and local NGOs were consulted on the project's environmental and social aspects.

As part of this ESMP, a public participation event was held for Jbeil Caza at the Union of Jbeil municipalities on Wednesday December 11, 2019. The aim was account for the public opinion regarding the proposed project.

Invitations were sent by the consultant on behalf of CDR to concerned municipalities and NGOs through official letters and emails. A sample of the invitation letter is attached in Annex 4. Invitations were sent to the concerned parties at least one week in advance from the meeting date.

During the public participation, project details, impacts and mitigation measures were presented in a 35-minute presentation (see more details in Annex 4), which has followed by an open discussion with the attendees. In particular, the consultant informed the attendees about the project objectives, the identified natural, economic, and social resources of importance in the area, the project's possible environmental and social risks, the project GRM mechanism, and the planned mitigation measures for their examination and approval.

The main attendees of the meeting were namely the heads of concerned municipalities (refer to the list of attendees in Annex 4.

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

a) 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 List of Contacted Local NGOs

Organization	Phone Number	Activities
Young Women's Christian Association Jbeil (YWCA)	09-540500	Being the oldest volunteer movement for women and girls in Lebanon, the YWCA aims to achieve social justice through programs for community development. It prioritizes the advancement and greater participation of women at all levels of society.
Amel Association	01-317293	Since its creation, in 1979, Amel has opened field hospitals, maternities, development and medical centers in addition to cooperatives in several areas, regardless of their political or religious affiliations. As part of its support to refugees program, it provides humanitarian aid to refugee communities, irrelevant of nationality. across the entire country.

Frontiers' Rights (Rouwad Houkouk)	01-383556	Ruwad was founded in 2014 after long years of advocacy work launched by its activists in 1999. The association defends the fundamental rights of marginalized groups in Lebanon, focusing on three areas: statelessness, right to asylum, and right to personal freedom, safety and non-refoulement (non-forced return to home country).

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 Jbeil Caza, the total number of registered Syrian is 8,377 individuals (UNHCR, 2017). 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 8-2: 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	• 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	• Development	Mr. French received the Project information sheet

	M: 79160375 E: jack.french@acted.org	• Infrastructure & Services Rehabilitation • Labor & Livelihoods • Shelter • Water sanitation and hygiene	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	• Direct Assistance • Protection • Shelter • Community Empowerment and Livelihoods	Mr. Hartmann Mr. French 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 (GRM)

The project will include a project-wide GRM that will register and address grievances and complaints from individuals and households who are affected by the project. Anonymous grievances will be addressed in both GRMs for communities and workers. The maximum anticipated time needed to close a GRM case is 45 days.

8.2.1 GRM for Surrounding Communities

The primary purpose of the GRM will be to provide clear and accountable means for project beneficiaries and affected persons to raise concerns of possible tensions and feelings of exclusion and complaints and seek solutions when they believe they have been harmed by the project. As such, the GRM will allow citizens to directly voice concerns or grievances to the implementing agency and ensure that these concerns are responded to and addressed in a timely manner.

The key objectives of the GRM are:

- Record, categorize and prioritize the grievances;
- Resolve the grievances via consultation with all stakeholders (and notify those stakeholders of the resolutions)
- Relay any unresolved cases to the relevant authority.

The GRM will be accessible to all relevant stakeholders who can use this mechanism to send their suggestions, concerns and complaints related to the project. 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 Jbeil 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 (see Figure 8-1):

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 Jbeil 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 Social Specialist of the PMU for the project. The issue shall be resolved within a maximum of two weeks.

Level 3: If the person is not satisfied with the decision of the Social Specialist of PMU, he or she can bring the complaint to the attention of the PMU Director's Office. Once the PMU 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.

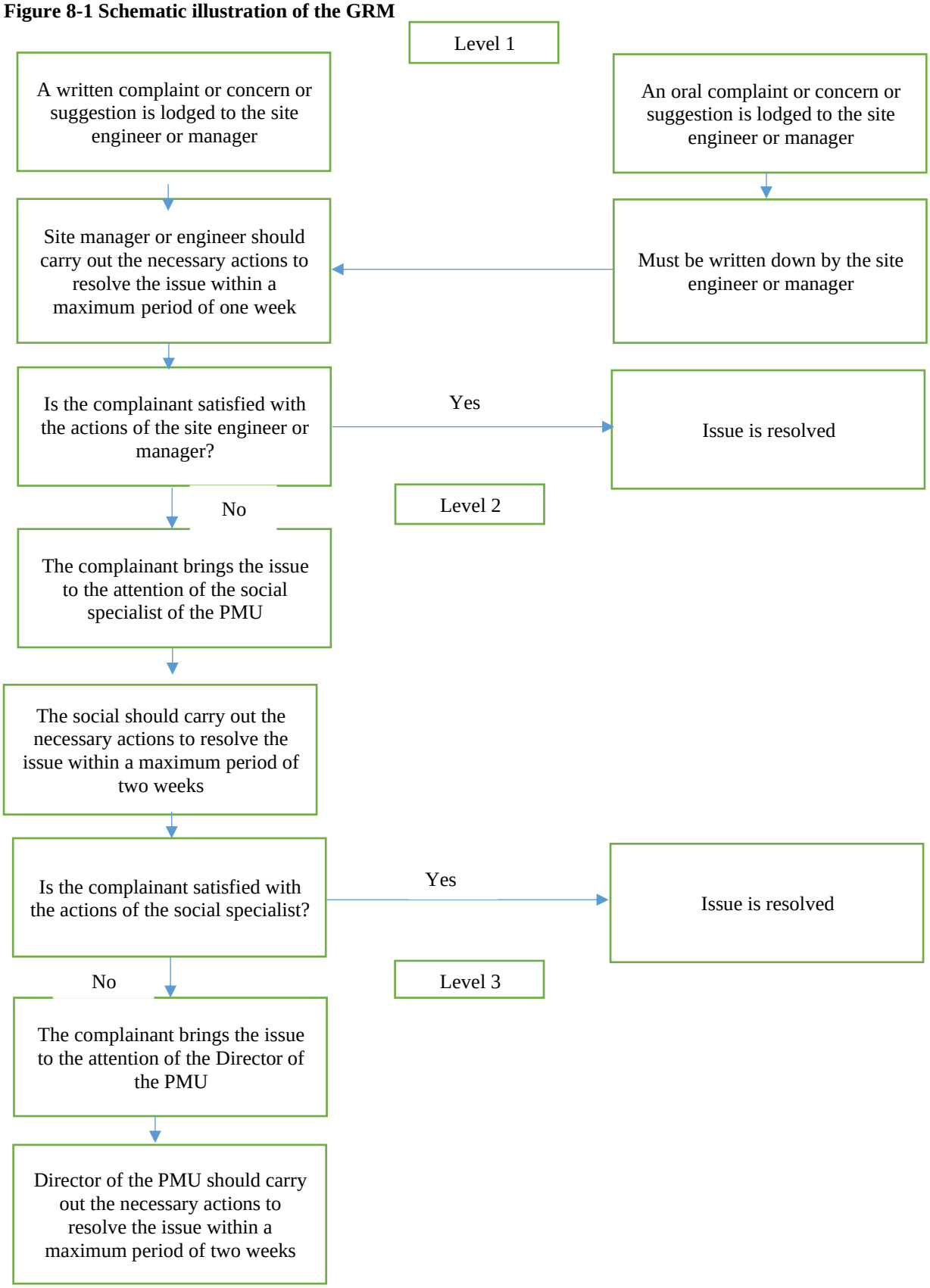
Moreover, reporting of the complaints to the PMU should be done regularly. The designated person at each level should report to the PMU on the number and subject of new complaints received, and the status of the already existing complaints, if any. The report should also inform the PMU of complaints that could not be resolved at the lower levels and are being elevated to the PMU Director's attention. The PMU 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 5) 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 Schematic illustration of the GRM



8.2.2 GRM for Workers

Similar to the GRM for surrounding communities, a GRM for internal employees, namely the labors onsite is also necessary. It aims to allow labors 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 5)

9. Conclusion

The ESMP identified and assessed the potential environmental and social impacts of REP and consulted relevant stakeholders when preparing the management plan.

In specific, this ESMP report addresses two selected roads for rehabilitation in Jbeil caza (roads R3 and R4) with a total length of around 28.02 km. The rehabilitation activities include: pavement works, improvement and installation of road surface drainage, construction of retaining walls and installation of safety barriers, marking and signing, and installation and maintenance of lighting poles. The works will involve 55 workers and require between 12 months and 18 months.

Road rehabilitation activities are expected to incur environmental impacts that are similar among all Jbeil caza roads. Common environmental impacts inlcude fugitive dust emissions, increase in noise, contaminaton of water quality, disruption to traffic movement, potential damages to existing utilities, and disturbance of local biodiversity. Once roads are rehabilitated, the project is expected to improve drainage systems (less runoff water), road safety conditions, reduce traffic accidents and traffic congestion, and ultimately enhance livelihood opportunities. On the other hand, the main expected environmental impacts on water and soil could result from maintenance activities if not managed properly during the "**Defects Liability Period'** during which the Contractor is responsible for maintenance activities.

In this context the contractor must implement proper waste and safety plans and all the environmental mitigation measures provided in this ESMP.

A proper management plan was provided for specific concerns regarding the roads in Jbeil. The plan includes measures to control exhaust emissions, dust and odor emissions, and soil manipulation activities during both phases of the project. Moreover, proper measures and guidelines on the control of accidental spills of construction materials were provided to prevent soil contamination. Regarding biodiversity, recommendations are provided to guide the project contractor in reducing the negative impacts on natural habitats and biodiversity. Mitigation actions included recommendations regarding rehabilitation work, schedules, and solid waste management in order to avoid degrading the concerned sites or disturbing the local fauna. Contractors must be careful during the rehabilitation work so that the direct impacts (direct destruction) on particular ecosystems and associated fauna would be minimal. Waste management plan must be adopted to avoid soil and water contamination that could have irreversible impacts on biodiversity. In other words, rehabilitation debris should not be dumped into the natural habitat (e.g. valleys, rivers). Further, rehabilitation activities must not take place during the two migration seasons for birds in order to avoid disturbing passenger birds (if feasible, namely for Jbeil R3, BNR).

The social risks of the project include potential risk of labor induced SH towards female workers and SEA towards women in the surrounding community, potential risk of child labor and poor labor conditions; unfair job allocation; underemployment of women; traffic disturbance; and provisional obstruction of access routes to sensitive receptors (some segments of Jbeil R3, and of Jbeil R4 section 1 are highly urbanized. Mainly, Jbeil R3 is surrounded by

numerous sensitive receptors such as churches and schools, located at a distance of less than 10 m from the roads. In this context, the ESMP provided measures to mitigate these risks through periodic monitoring of labor conditions, specific required clauses within contracts that aim to protect workers, and the CoC for GBV issues. In addition, a robust GRM must be clearly communicated to all project-affected persons before and during project implementation.

Moreover, a monitoring plan was set along with defined responsibilities for the operationalization of the ESMP. In other words, the ESMP generated key project indicators (social and environmental indicators) to monitor project implementation success. It is designed to guarantee effectiveness in the measurement of major project outcomes and outputs based on measurable indicators.

Lastly, a Construction Environmental and Social Management Plan must be prepared once the contractors are appointed. This CESMP must account as well for the recommendations and guidelines provided within this ESMP to ensure protection of the surrounding environment and the society.

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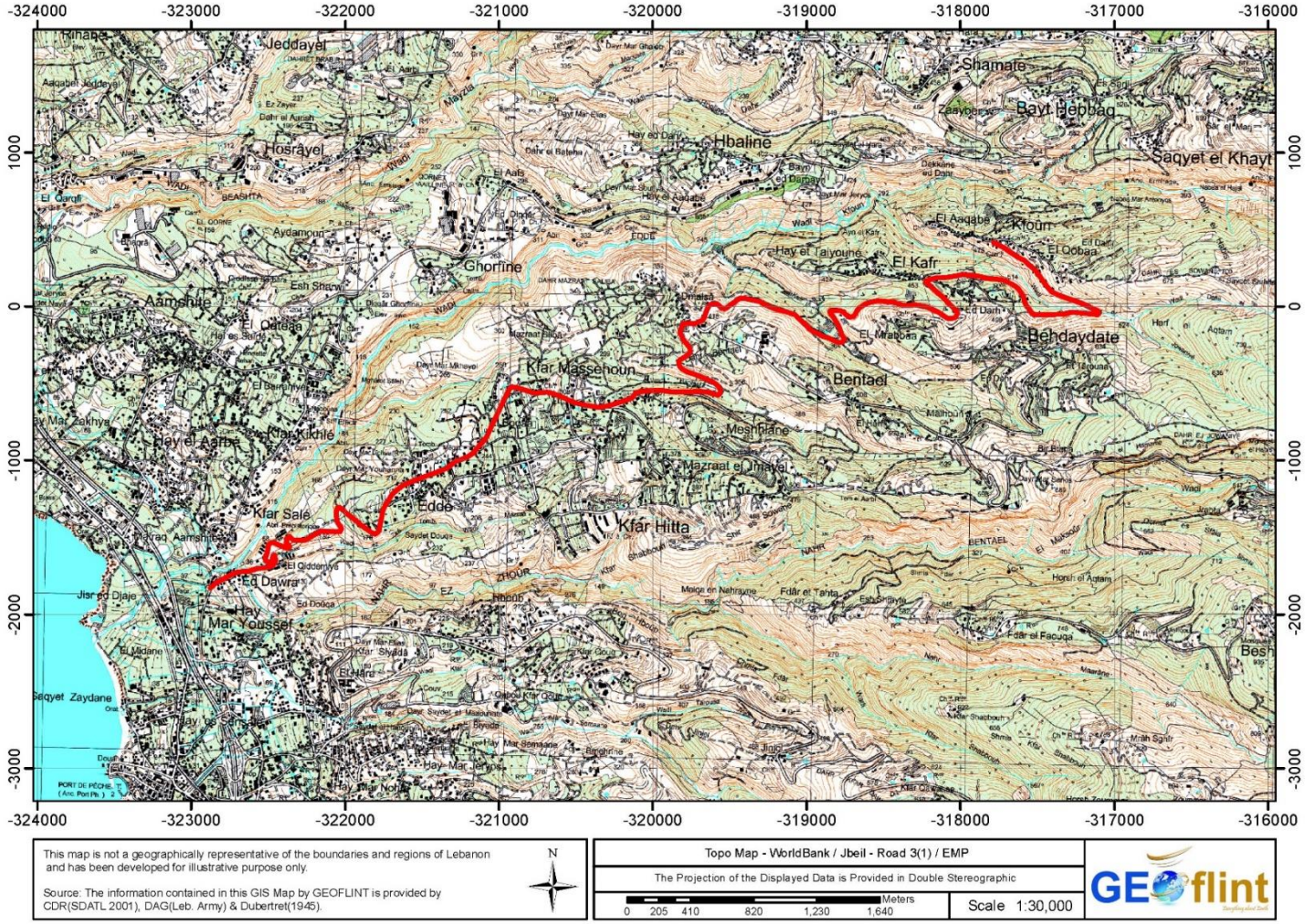
Annex

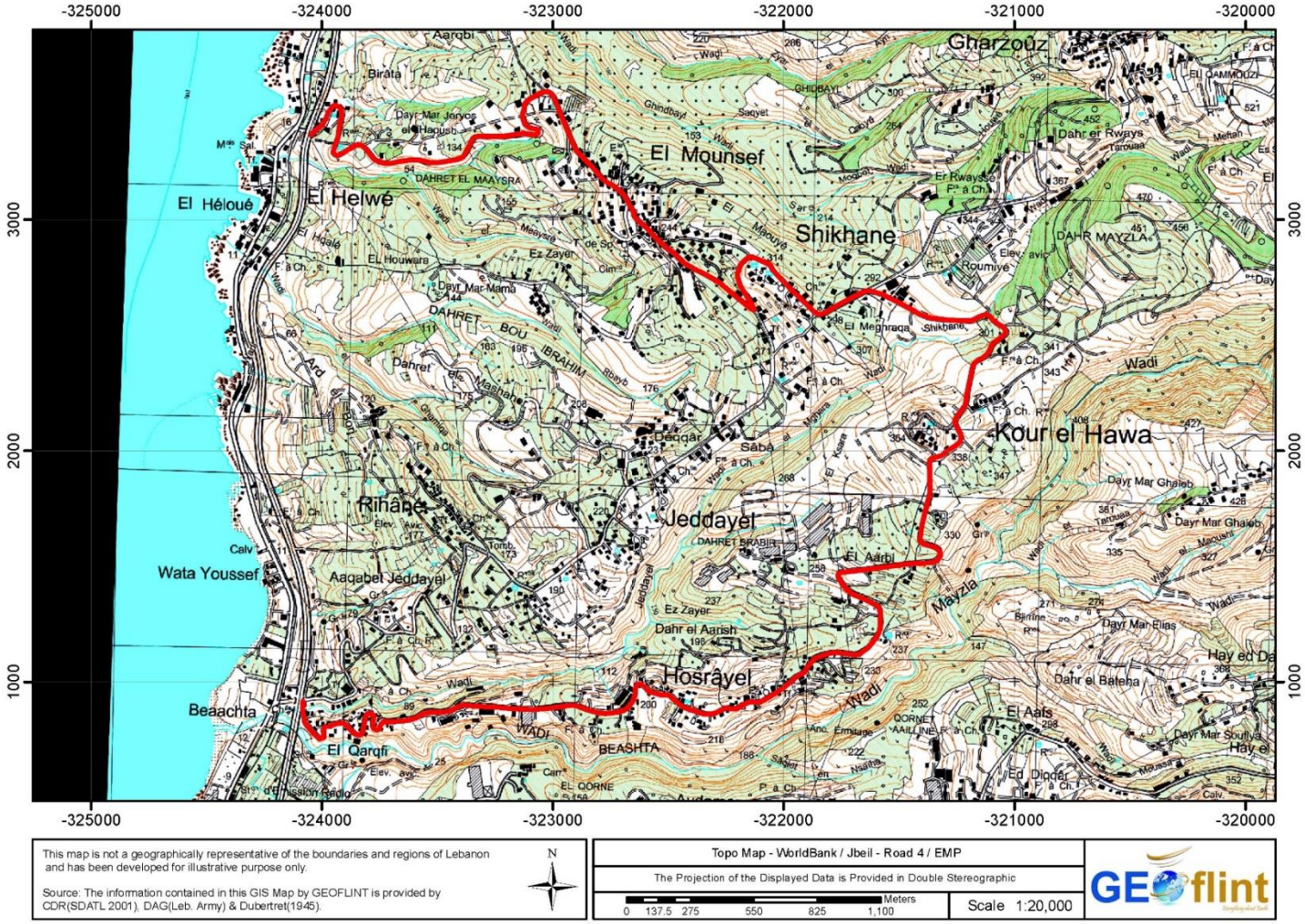
Annex 1: Figures and Tables Related to Chapter 4

Figure A Elevation contour lines for Jbeil R3 and its surrounding



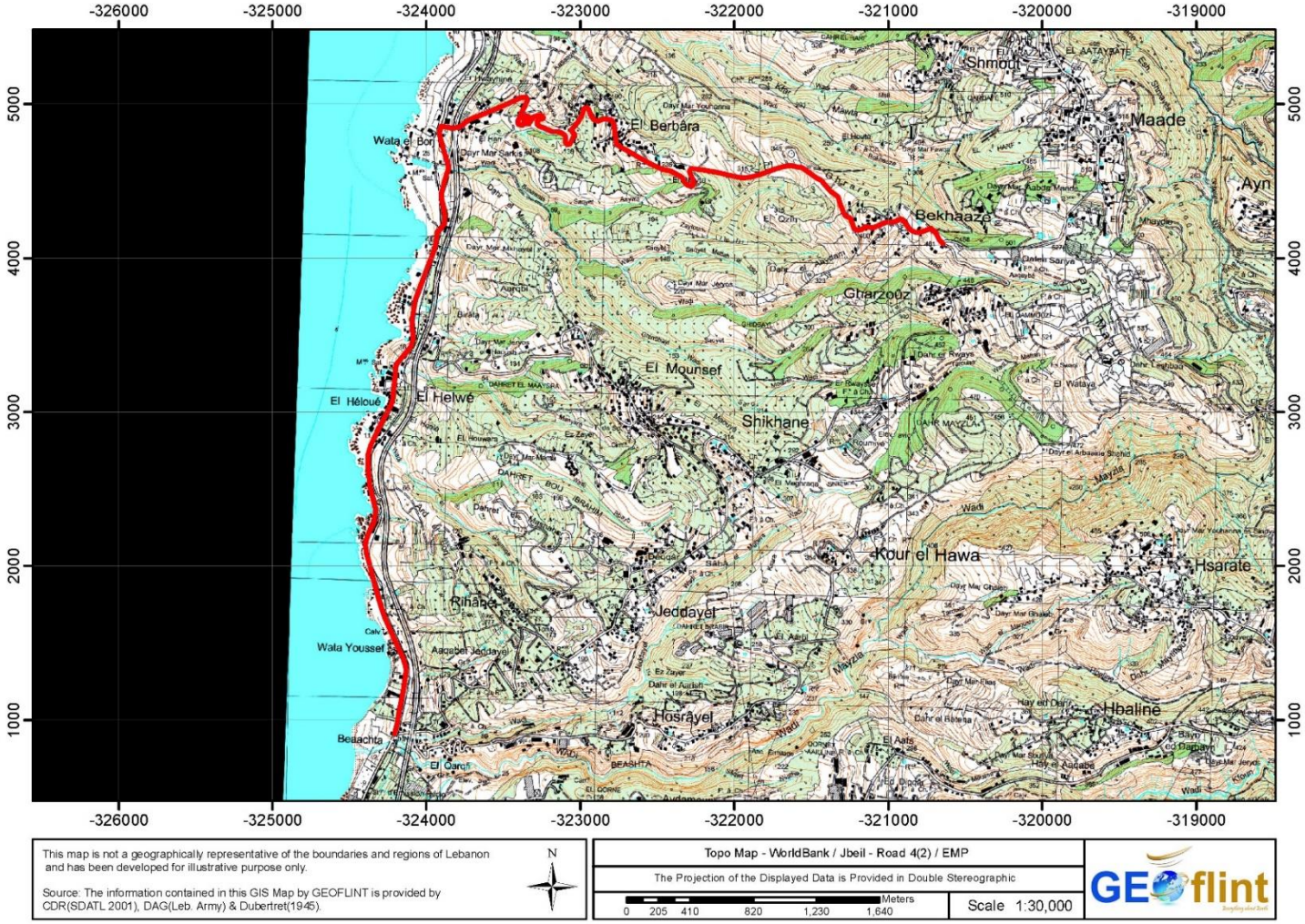
Source: CDR, DAG, & Dubertret; processed by Geoflint

Figure B Elevation contour lines for Jbeil R4 (section 2) and its surrounding



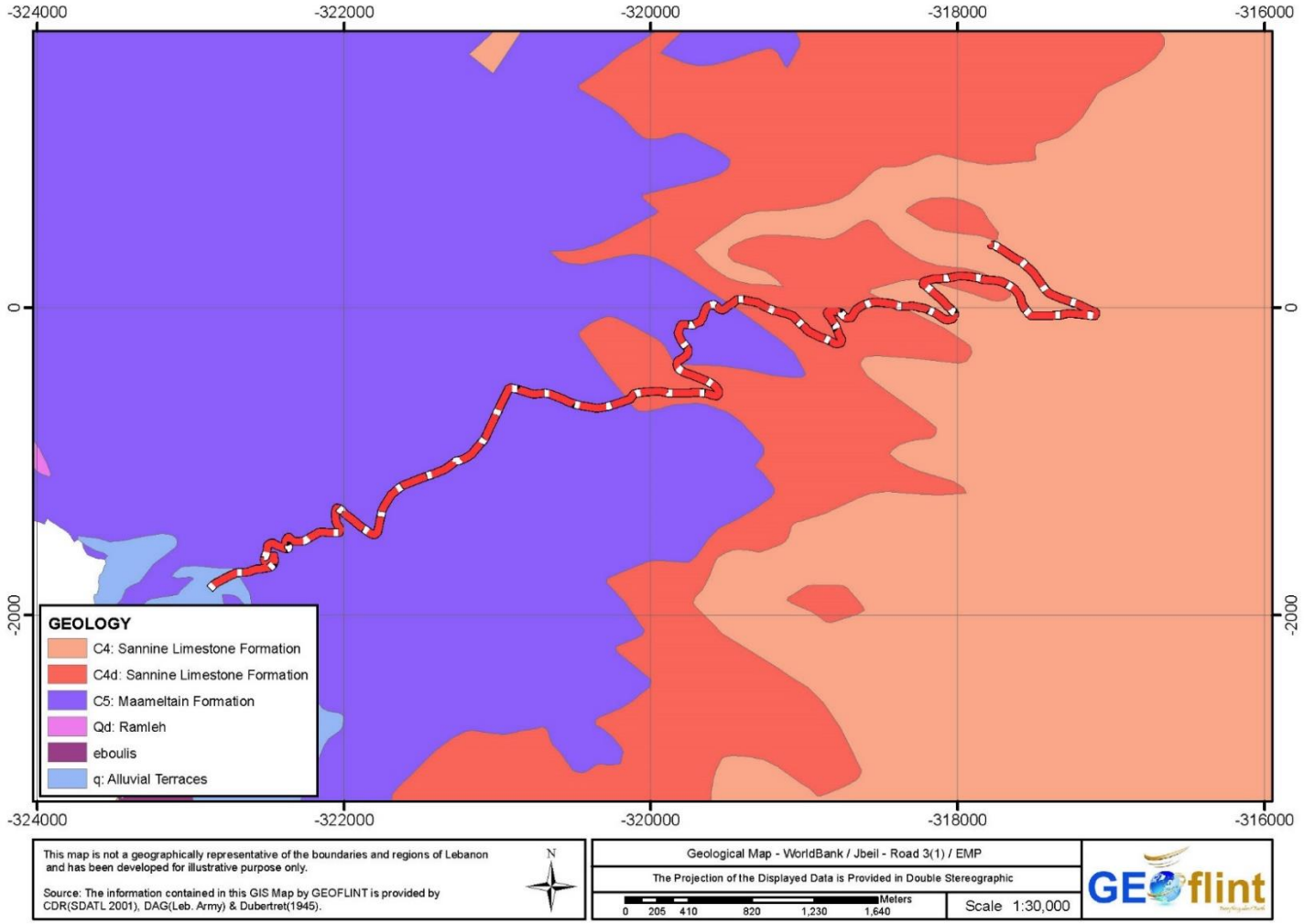
Source: CDR, DAG, & Dubertret; processed by Geoflint

Figure C Elevation contour lines for Jbeil R4 (section 1) and its surrounding



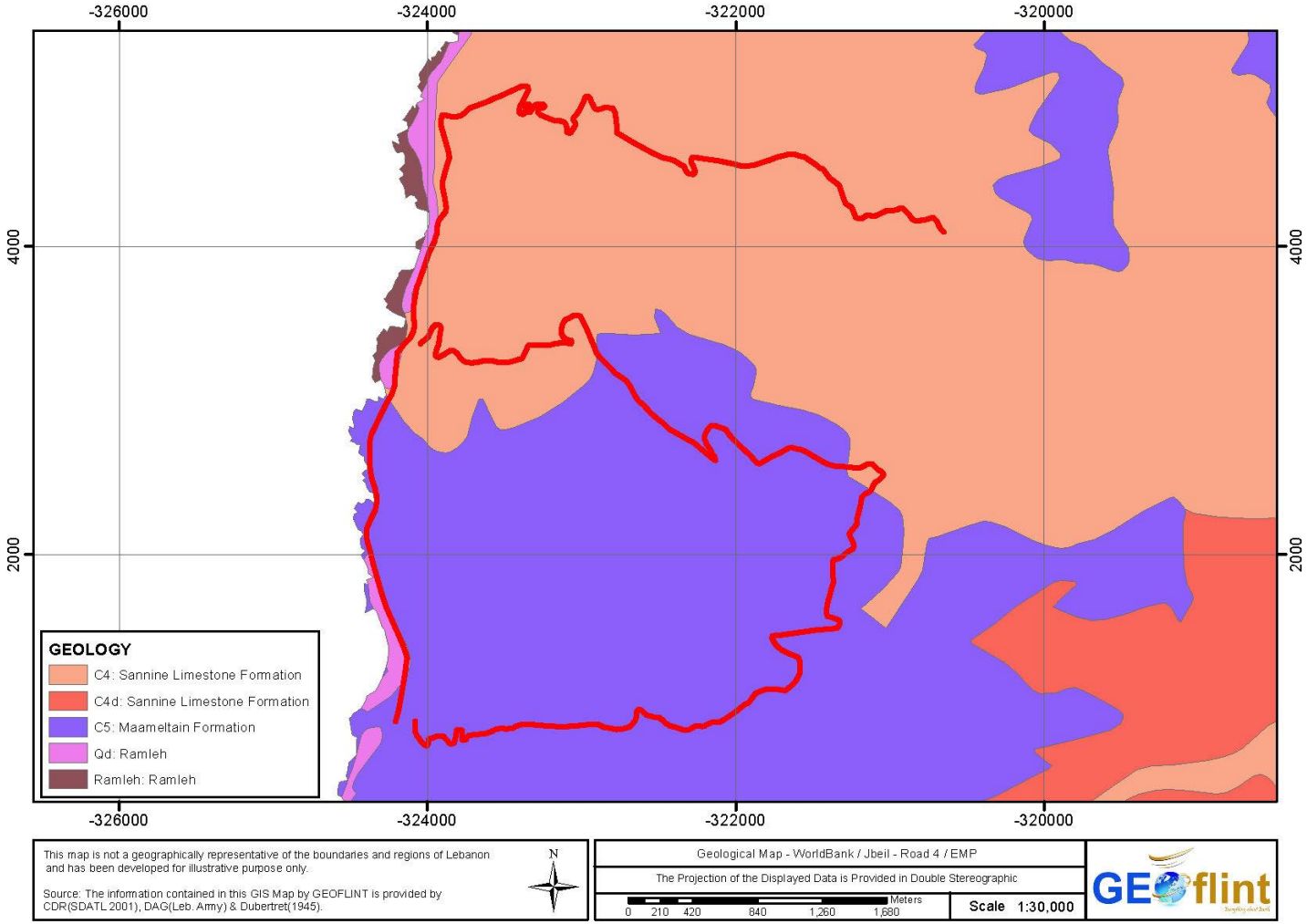
Source: CDR, DAG, & Dubertret; processed by Geoflint

Figure D General Geological map of Jbeil R3 and its surrounding (surface outcrops)



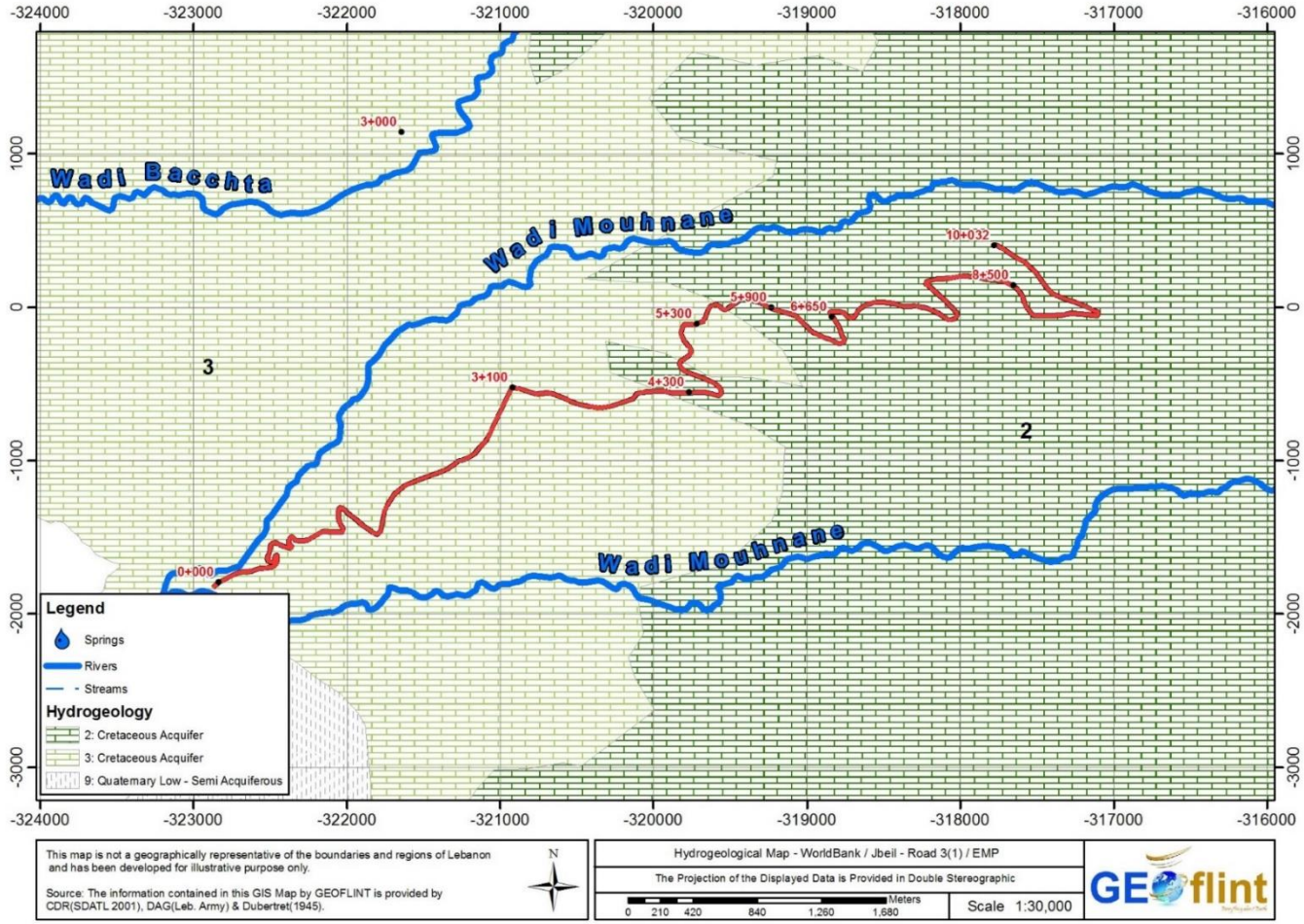
Source: CDR, DAG, & Dubertret; processed by Geoflint

Figure E General Geological map of Jbeil R4 and its surrounding (surface outcrops)



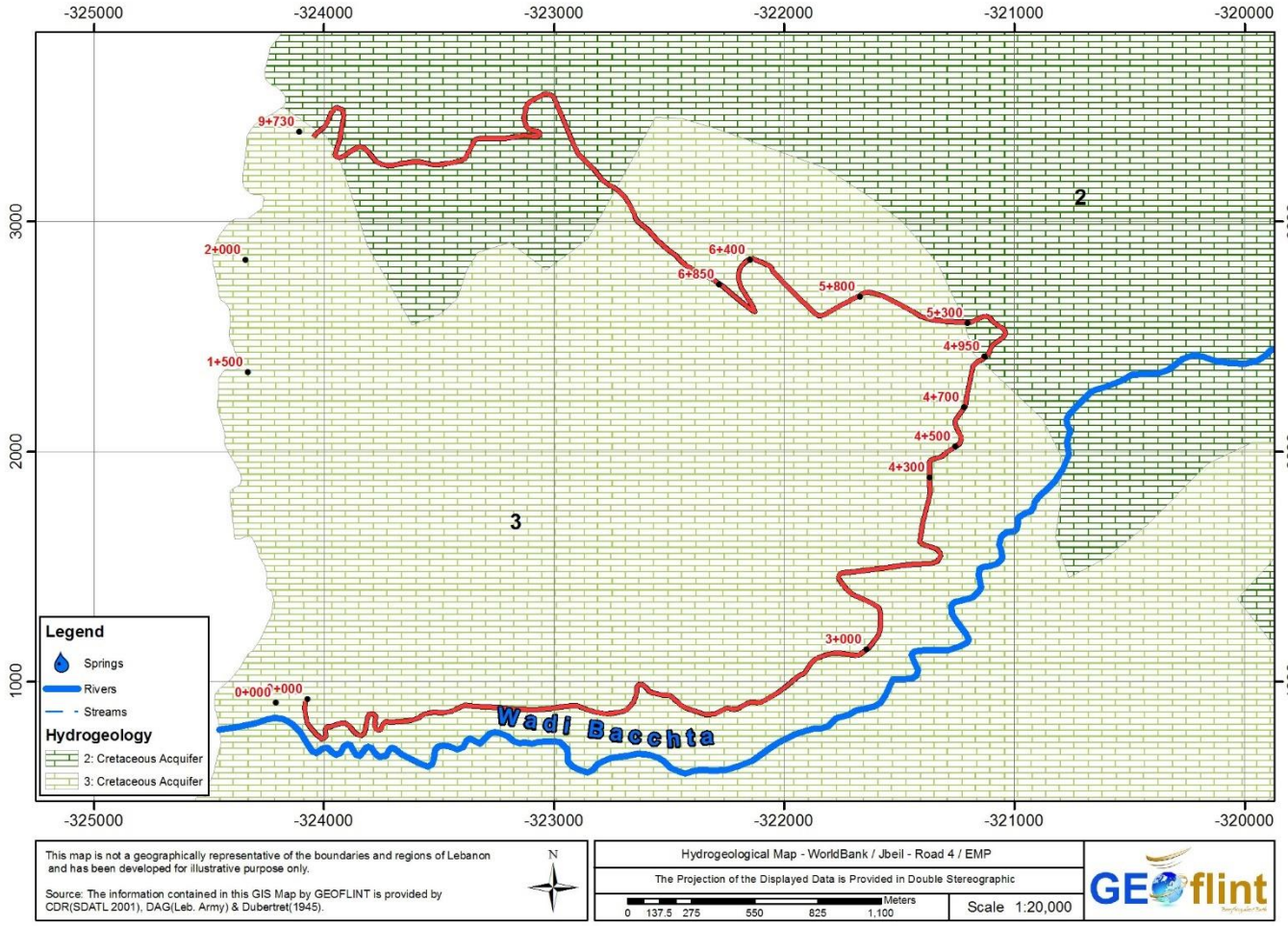
Source: CDR, DAG, & Dubertret; processed by Geoflint

Figure F Hydrogeological map of Jbeil R3 and its surrounding (map showing water potential of the subsurface). Refer to Table 4 4 for description of hydrogeology classes.



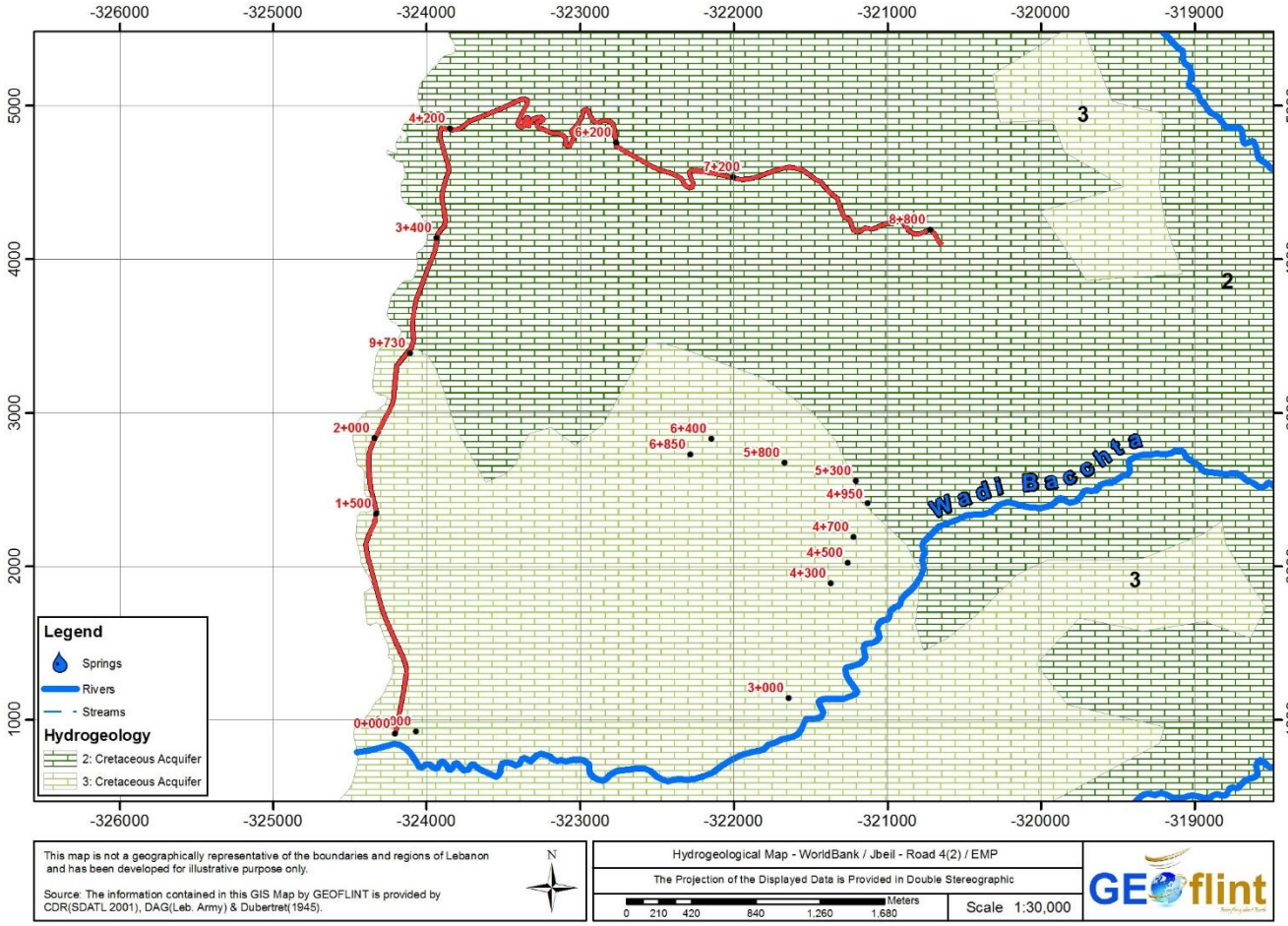
Source: CDR, DAG, & Dubertret; processed by Geoflint

Figure G Hydrogeological map of Jbeil R4 (section 1) and its surrounding (map showing water potential of the subsurface). Refer to Table 4 4 for description of hydrogeology classes.



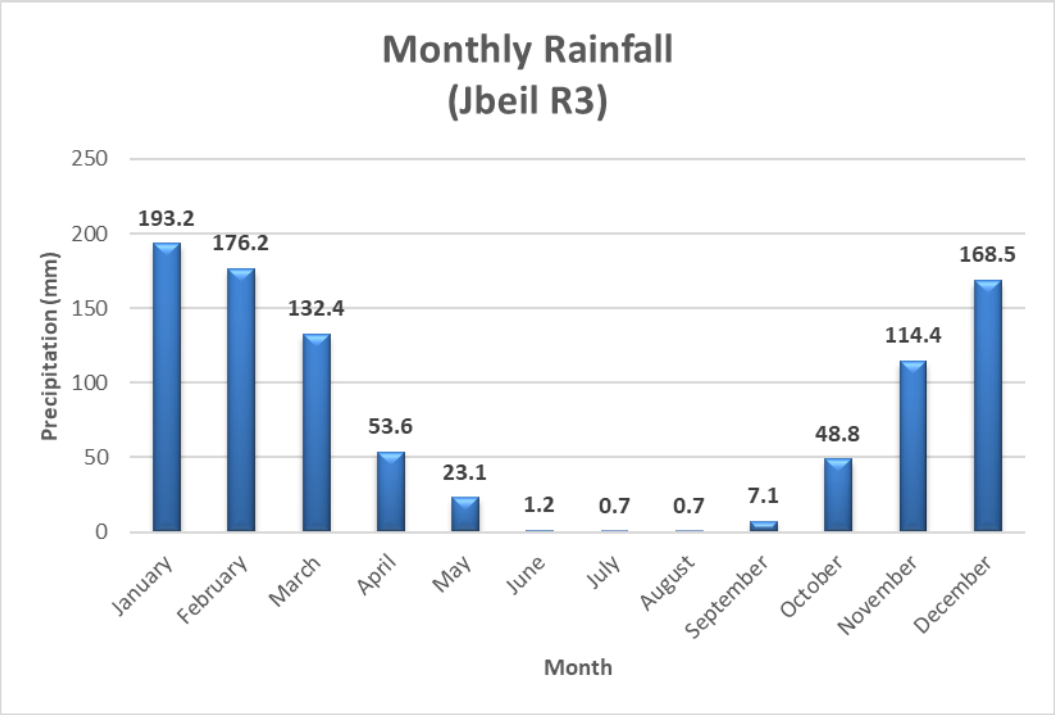
Source: CDR, DAG, & Dubertret; processed by Geoflint

Figure H Hydrogeological map of Jbeil R4 (section 2) and its surrounding (map showing water potential of the subsurface). Refer to Table 4 4 for description of hydrogeology classes



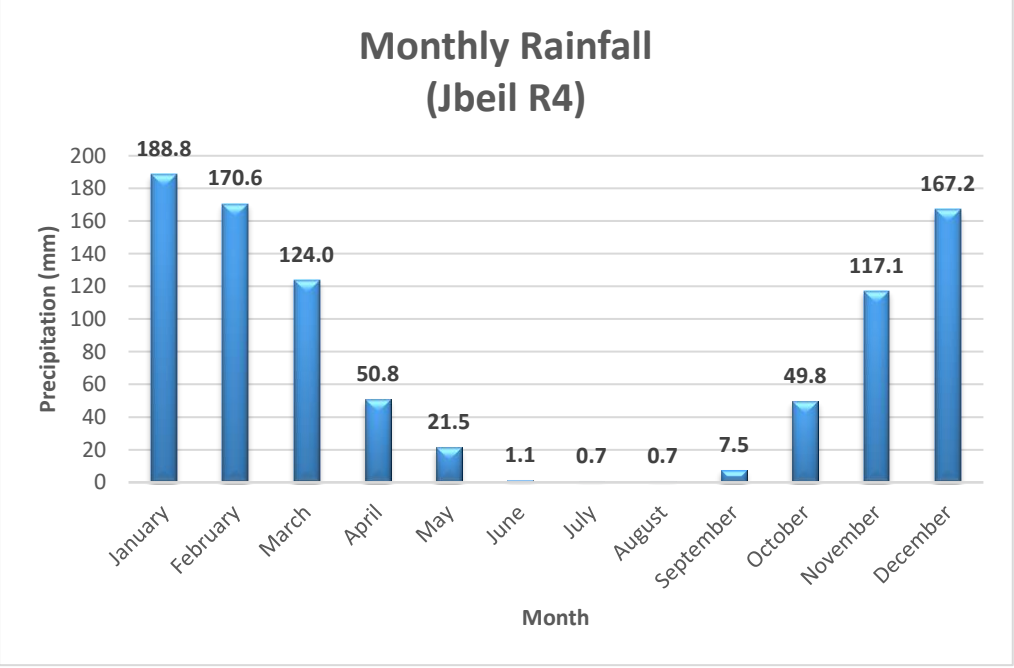
Source: CDR, DAG, & Dubertret; processed by Geoflint

Figure I Precipitations values along Jbeil R3 alignment (period extending between 1996-2018) CHIRPS satellite 4.5 km spatial resolution



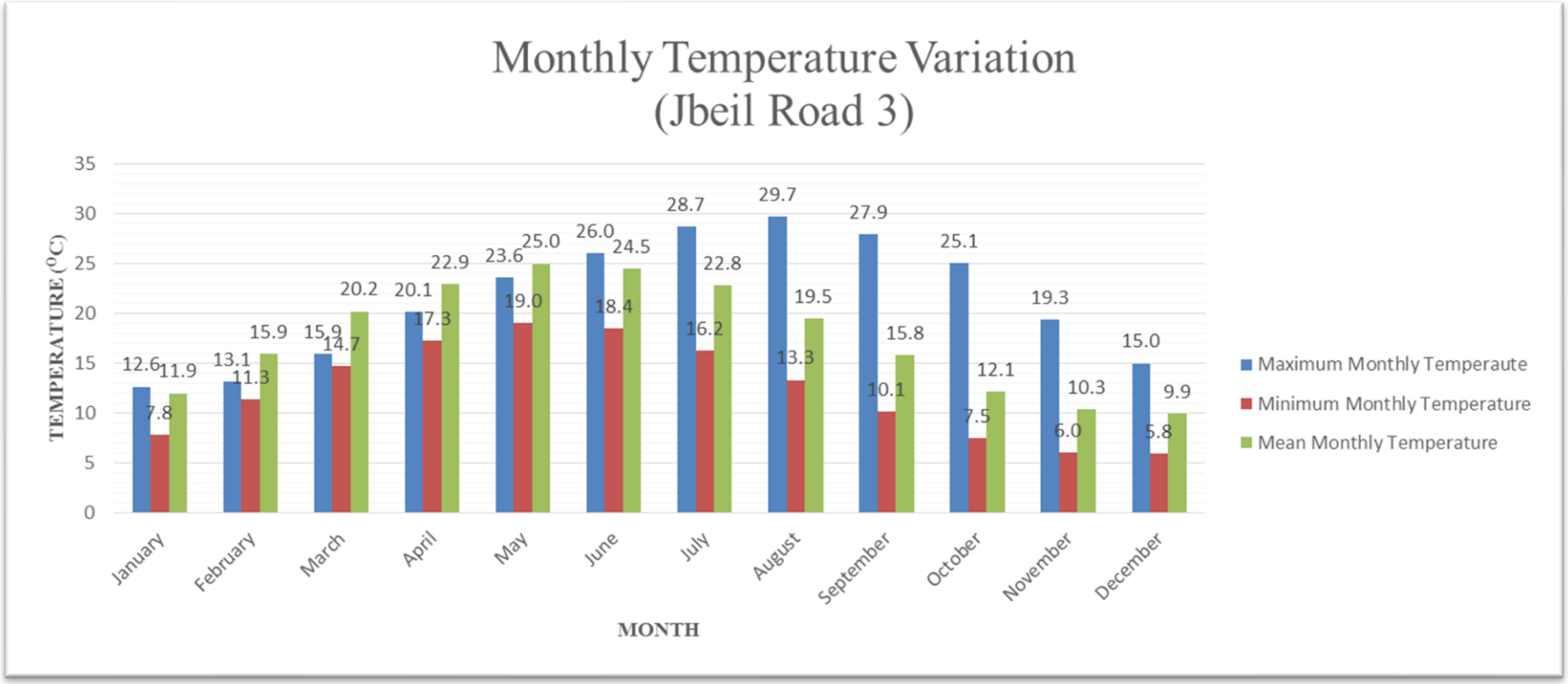
Source : CHIRPS satellite

Figure J Precipitations values for Jbeil R4 (1996-2018) CHIRPS satellite 4.5km spatial resolution



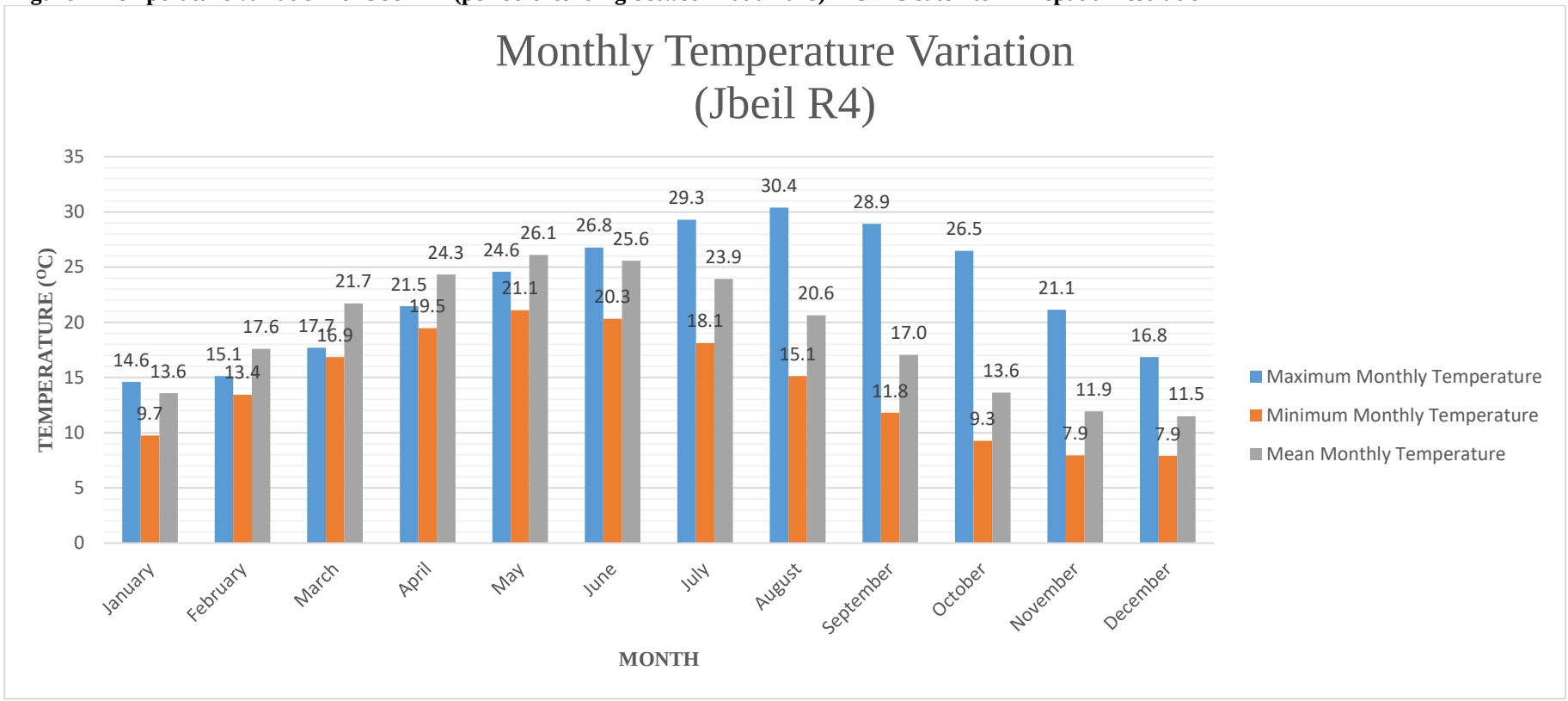
Source : CHIRPS satellite

Figure K Land surface temperature variation for Jbeil R3 (period extending between 2000-2018) MODIS satellite 1km spatial resolution



Source: MODIS satellite

Figure L Temperature variation for Jbeil R4 (period extending between 2000-2018) MODIS satellite 1km spatial resolution



Source: MODIS satellite

Table A Jbeil R3 existing acoustic conditions (location of stations shown in Figure M)

	Time	Station	Min (dB)	Leq (avg) (dB)	Max (dB)	Z (m) (above M.S.L.)	Allowable Noise Level
December 4, 2018	11:06	0+048	51.4	64.1	73.2	54.05	Refer to Table 2-5
	11:21	3+260	38.2	56.9	66.6	307.48	
	14:15	4+350	45.9	66.1	80.8	134.12	
	11:31	5+250	35	52.4	61.7	424.51	
	13:20	7+600	46.2	73	80.8	482.12	
	11:56	7+700	40.3	47.1	50.7	464.32	
	12:13	9+950	40.6	54.1	64	115.35	

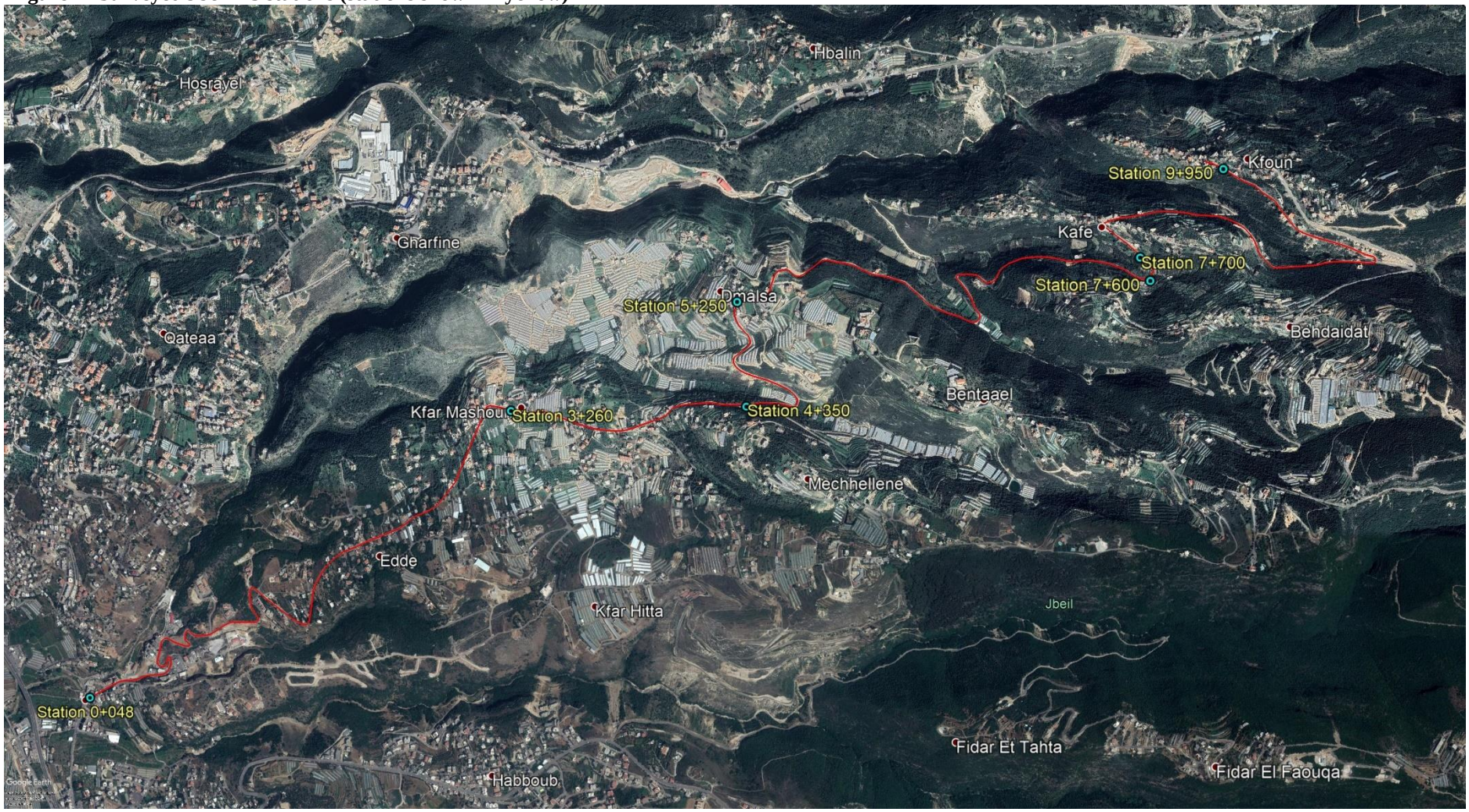
Source: Geoflint acoustic survey, 2018

Table B Comparing decibel measurements to an ordinary conversation (Trace R&D Center University of Wisconsin-Madison, 2004)

Sound Environment	Sound Pressure Level (dB)	Approximate loudness with regard to ordinary conversation
Threshold of hearing	0	Don't hear anything
Broadcast studio interior or resulting leaves	10	1/32nd as loud as conversation
Quiet house interior or rural night-time	20	1/16th as loud
Quiet office interior or watch ticking	30	1/8th as loud
Quiet rural area and small theatre	40	1/4th as loud
Quiet suburban area of dishwasher in next room	50	½ as loud
Office interior or ordinary conversation	60	Ordinary conversation
Vacuum cleaner at 10 ft	70	Twice as loud
Passing car at 10ft or garbage disposal at 3ft	80	4 times as loud
Passing bus or truck at 10ft or food blender at 3ft	90	8 times as loud
Passing subway train at 10ft	100	16 times as loud
Nigh club with band playing	110	32 times as loud
Threshold of pain	120	64 times as loud as conversation

Source: Trace R&D Center University of Wisconsin-Madison, 2004

Figure M Surveyed Jbeil R3 stations (stations shown in yellow)



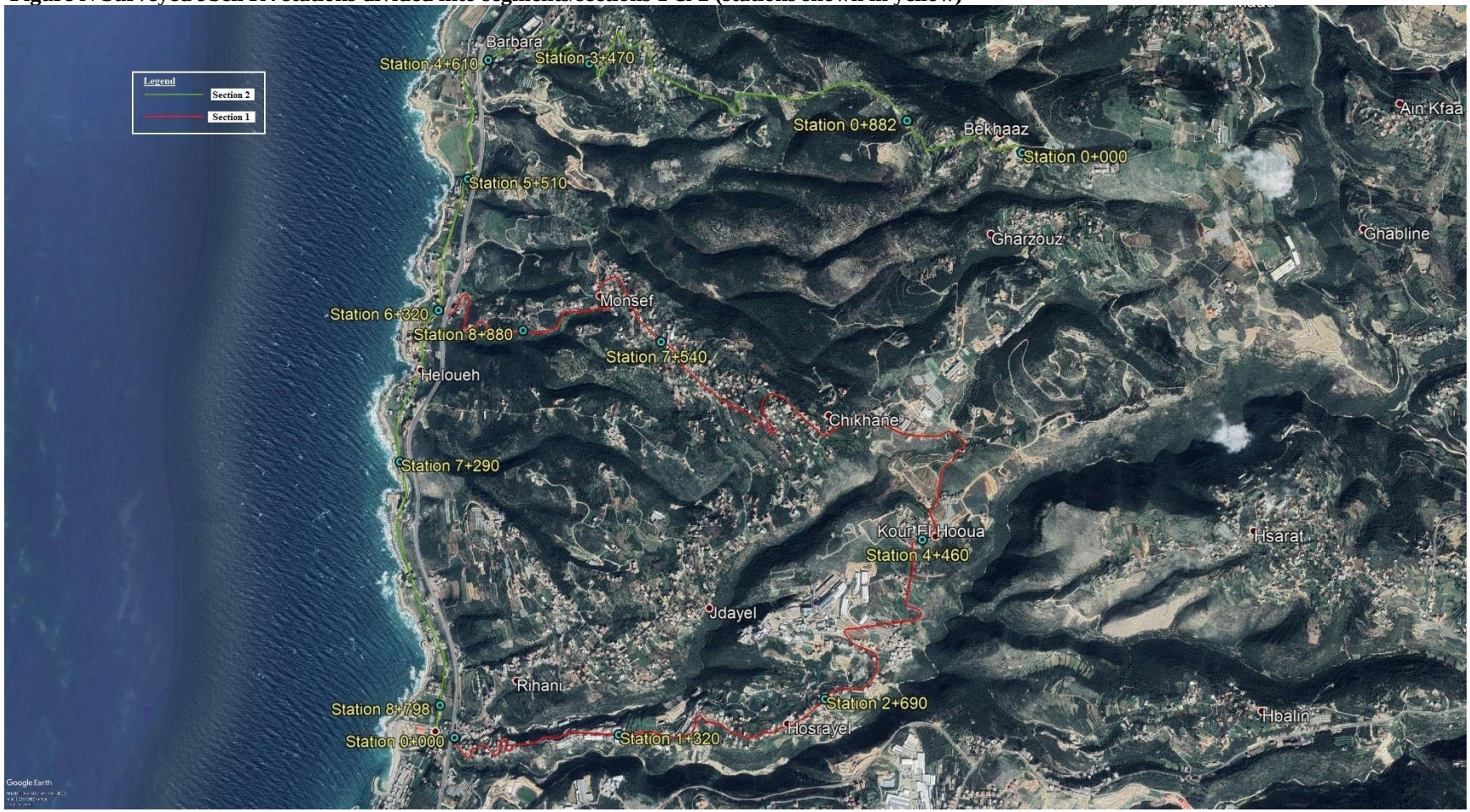
Source: Geoflint s.a.r.l. acoustic survey results, 2019

Table C Jbeil R4 existing acoustic conditions (location of stations shown in Figure N)

	Time	Station		Min (dB)	LA (10) (dB)	Leq (avg) (dB)	Max (dB)	Z (m) (above M.S.L.)	Allowable Noise Level
Wednesday, December 5, 2018	12:14	Section 2	0+000	61.6	85.5	80.9	90.4	30.72	Refer to **Table 2-5**
	12:26		1+320	46.7	70.7	69.7	82.6	153.54	
	12:36		2+690	42	64.5	64.1	76.3	228.84	
	12:49		4+460	38.6	56.6	60.5	74.7	349.72	
	13:09		7+540	44.2	64.4	59.4	69.5	241.71	
	13:28		8+880	58.1	76.1	76.2	90.5	104.26	
	14:35	Section 1	0+000	34.7	49.7	48.2	58.3	466.18	
	14:28		0+882	49.4	60.8	61	72.2	395.24	
	14:01		3+470	41.6	48.5	48.9	58.9	136.73	
	13:54		4+610	53.7	63.8	61.1	64.3	47.47	
	15:13		5+510	57.9	68.2	64.4	72.1	27.96	
	13:39		6+320	52.7	70.5	67.6	79	18.36	
	15:18		7+290	51.2	63.4	60.3	70.5	23.73	
	15:24		8+798	49.3	54.8	58.7	70.3	23.64	

Source: Geoflint acoustic survey, 2018

Figure N Surveyed Jbeil R4 stations divided into segments/sections 1 & 2 (stations shown in yellow)



Source: Geoflint s.a.r.l. acoustic survey results, 2019

Figure O LULC map with work stations shown in red along Jbeil R3 alignment

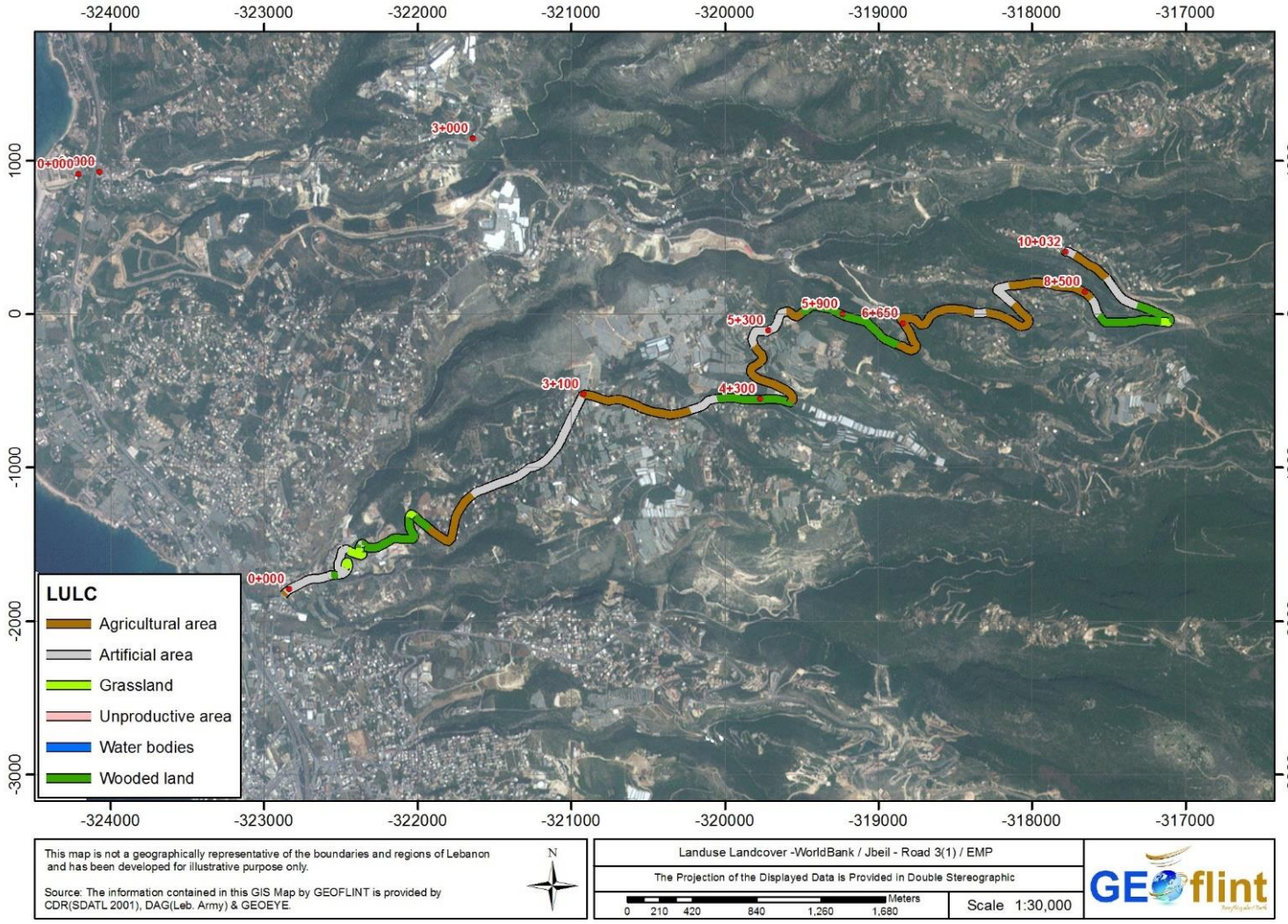


Figure P LULC map with work stations shown in red along Jbeil R4 alignment (section 1)

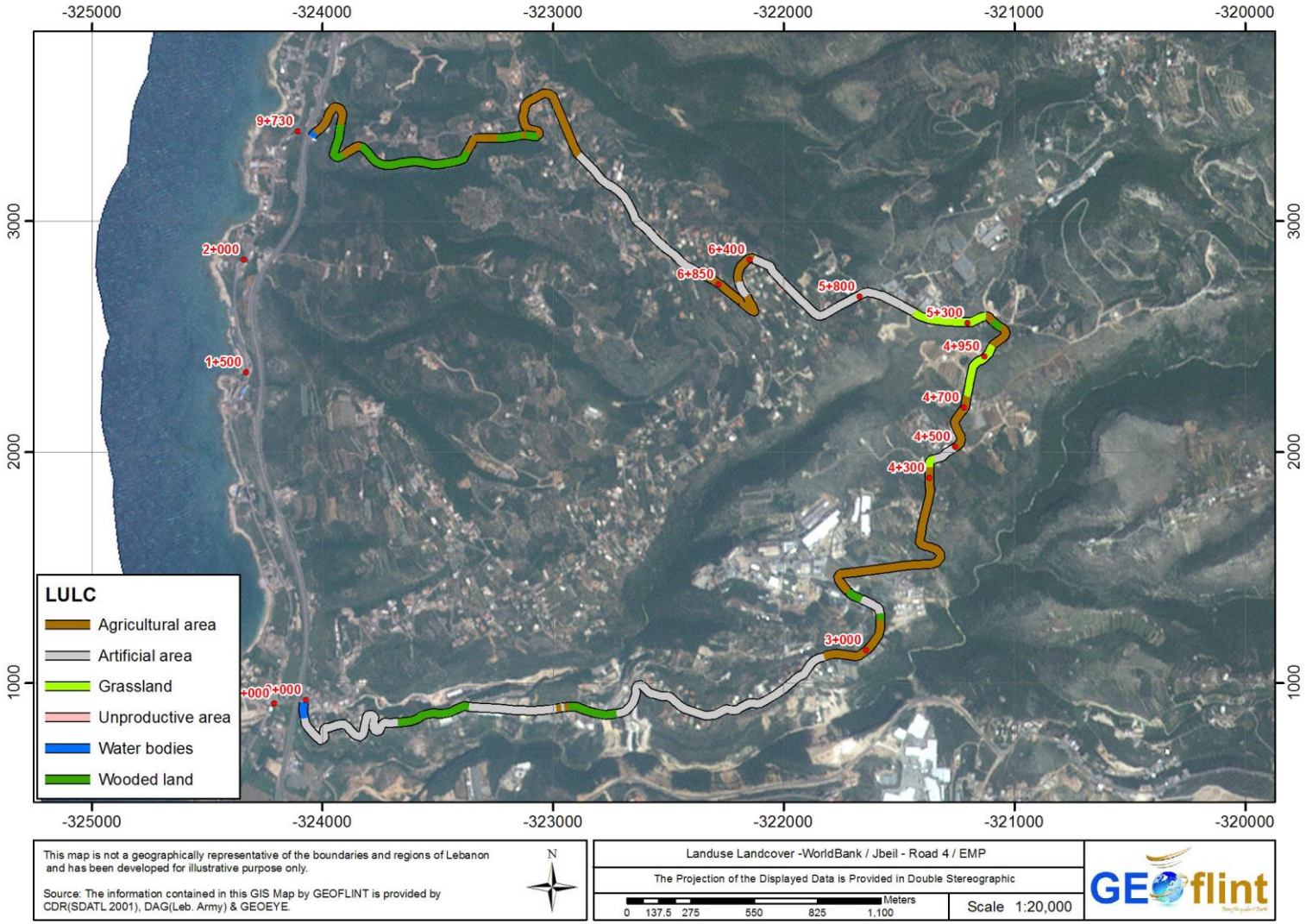


Figure Q LULC map with work stations shown in red along Jbeil R4 alignment (section 2)

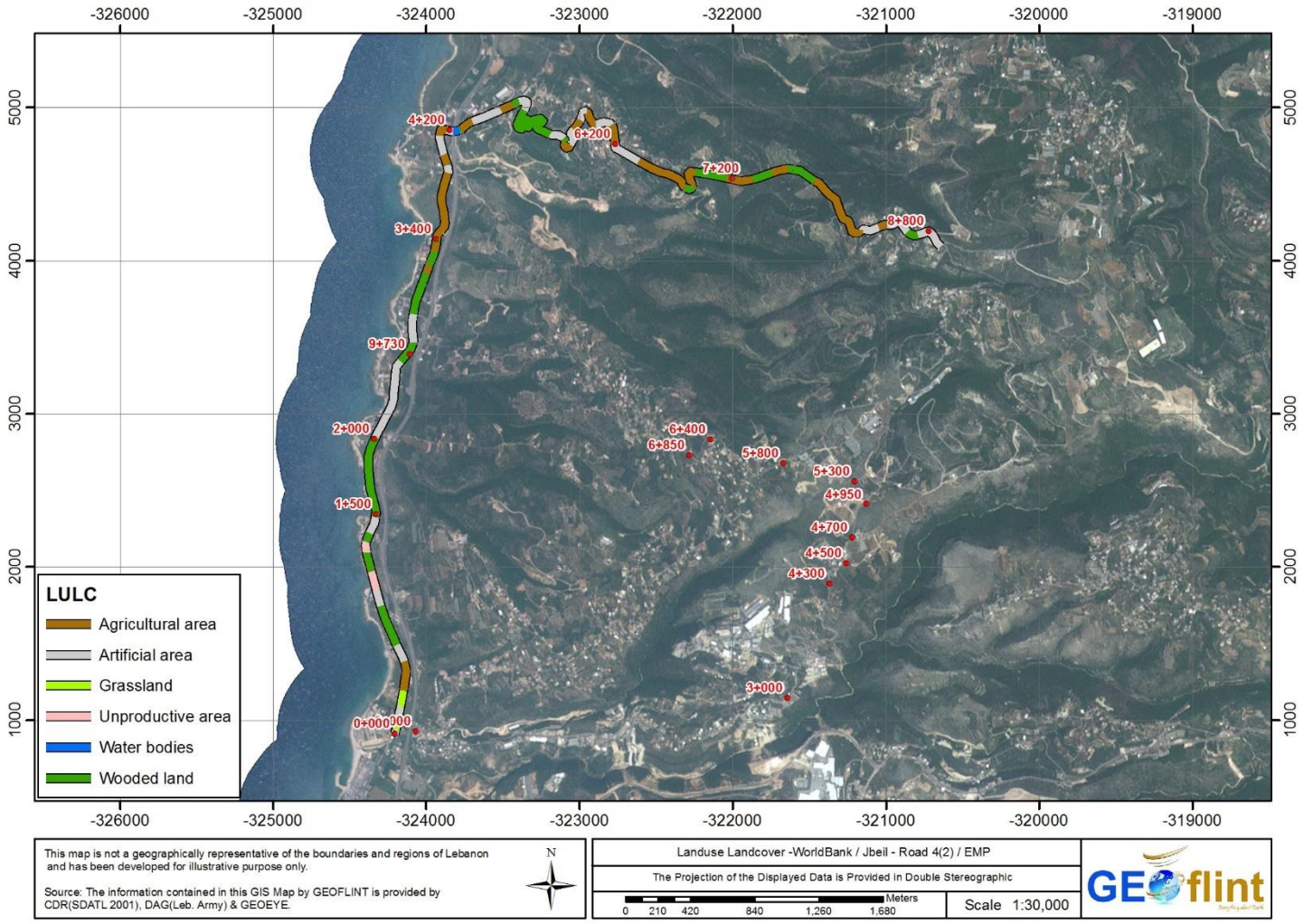


Table D Socio-economic data for Jbeil Caza

Category	Value		Source
Demographic Profile			
Population count	92,016		MoPH, 2016
Average number of people per household	3.7		LFHLCS 2018-2019
Registered births/year	1,466		MoPH, 2016
Distribution of registered births by gender	Female	726	MoPH, 2016
	Male	720	
Registered deaths/year	609		MoPH, 2016
Distribution by age group	<15	22,636	MoPH, 2016
	>65	8,926	
	Active Population	60,454	
Number of Displaced Syrians	8,377		MOE/EU/UNDP, 2014
Number of Displaced Palestinians	0		OCHA, 2016
Economic Conditions			
Unemployment rate	5%		IDAL, 2019
Number of Lebanese above poverty line	69,933		OCHA, 2016
Number of deprived Lebanese	10,728		OCHA, 2016
Industrial activities	3.2% of total number of industries in Lebanon		MOI/UNIDO/ALI, 2010
Lebanese above poverty line in jbeil	69,933		OCHA, 2016
Deprived Lebanese in Jbeil	10,728		OCHA, 2016
Syrian refugees' household below poverty line in Jbeil:	64.8%		VASYR, 2017
Health Services			
Number of primary healthcare centers	2		MOPH, 2019
Number of Private Hospitals	2		MOPH, 2019
Number of Public Hospitals	1		MOPH, 2019
EDUCATION			
Number of public schools	23		CRDP, 2016
Number of private schools	22		CRDP, 2016
INFRASTRUCTURE			
Water and Wastewater Infrastructure			
Water wells	0.4%		MOE/UNDP/ECODIT, 2011
Presence of water network	89%		MOE/UNDP/ECODIT, 2011
Presence of wastewater network	9.5%		MOE/UNDP/ECODIT, 2011
Availability of wastewater treatment units	Jbeil wastewater treatment plant		FAO, 2016

	Kafr wastewater treatment plant Ain Kfaa wastewater treatment plant Haqel wastewater treatment plant El Kharbe wastewater treatment plant Tartij wastewater treatment plant Laqlouk wastewater treatment plant Qartba wastewater treatment plant Lassa wastewater treatment plant Yanouh wastewater treatment plant Qarqaiya wastewater treatment plant Bchille wastewater treatment plant Chloumay wastewater treatment plant Ghalboun wastewater treatment plant	
Solid Waste Infrastructure		
Collection services		-
Solid waste management facilities	-	EU/MoE/GFA, 2017
Number of dumpsites	1 operational dumpsites (Volume=600,000 m^3)	MoE/UNDP, 2017
Religious Infrastructure		
Places of worship	371	International City/County Management Association (ICMA), 2011

Table E Relevant sensitive receptors encountered along and near Jbeil R3 alignment

Category	Name	Nearest distance from Jbeil R3 (m)
Church	NaamatAlla Church	0
	Mar Nicolas Church Remains (St Nicholas Church Remains)	4
	Church	4
	Mar Estaphan Church Remains (St Stephen Church Remains)	5
	Church	6
	Mar Tadros Church (St Theodore Church)	6
	Mar Qobrianos Church (St Cyprian Church)	11
	Mar Nohra Church (St Lucius Church)	20
	Saydet Malhoun Church (Our Lady of Malhoun Church)	22
	Church	22
	Mar Yaaqoub Church (St Jacob Church)	29
	Mar Doumlasa Church (St Doumlasa Church)	30
	Mar Charbel Church (St Charbel Church)	31
	Mar Gerges Church (St George Church)	35
	Mar Sophia Church (Ste Sofia Church)	52
	Al Karmel Church	58
	Mar Semaan Church (St Simon Church)	64
	Mar Gerges Church (St George Church)	73
	Mar Adna Church (St Adna Church)	78
	Mar Mama Al Raai Church (Saint Mamas Al-Raai Church)	89
	Mar Mema Church (St Mamas Church)	96
School	Kfar Mashoun Mixed Public Middle School	106
Mosque	Al Imam Ali Bin Abi Taleb Mosque	114
Church	Mar Challita Church (St Artemius Church)	157
	Mar Elisha Church (St Elisha Church)	163
School	Mihaniyat Edde Jbeil School	192

Church	Mar Doumit Church Remains (St Domitian Church Remains)	211
Church	Mar Tadros Church (St Theodore Church)	268
	Mosque	286
	Saydet Al Najat Church (Our Lady of Deliverance Church)	318
	Saydet Douqa Church Ruin (Our Lady of Douqa Church Ruins)	323
	Saydet Douqa Church Ruin (Our Lady of Douqa Church Ruins)	323
Shrine	Mzar Al Saydet (Our Lady Shrine)	324
Church	Mar Sarkis Church (St Sergius Church)	332
School	Kfar Sala Mixed Public Middle School	427
Religious	Mar Youhanna Hermitage (Saint John Hermitage)	468

Source: Geoflint s.a.r.l. survey results, 2019

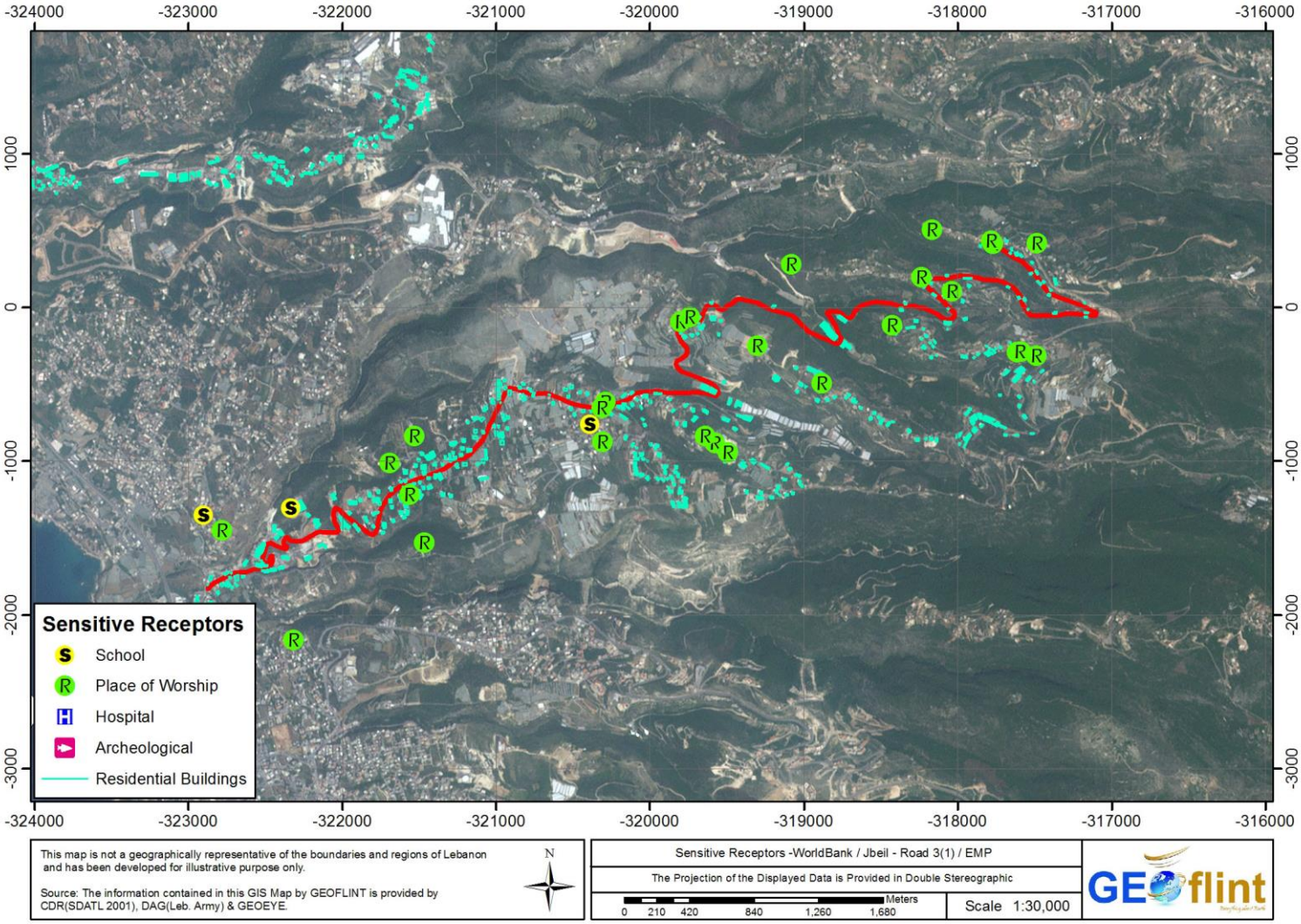
Table F Relevant sensitive receptors encountered along and near Jbeil R4 alignment

Category	**Name**	**Nearest Distance to Jbeil R4 (m)**
Church	Church	5
	Chikhane Church Ruin	15
	Mar Semaan Church (St Simon Church)	15
	Mar Faouqa Church (St Phocas Church)	21
	Mar Gerges Church (St George Church)	26
	Saydet Al Niyah Church (Our Lady of Al-Niyah Church)	29
	Saydet Al Barbara Church (Our Lady of Al-Barbara Church)	35
	Laqlouq Old Church	35
	Saydet Chikhane Church (Our Lady of Chikhane Church)	36
	Mar Elias Al Hay Church (St Elias Al Hay Church)	81
	Church	85
	Church	100
	Tadros Kour Al Hawa Church	106
School	Monsef National School	113

Church	Saydet Al Niyah Church (Our Lady of Al-Niyah Church)	337
	Al Saydeh Church (Our Lady Church)	362
School	Saint Louis Secondary School of Al Mahaba Sisters	459

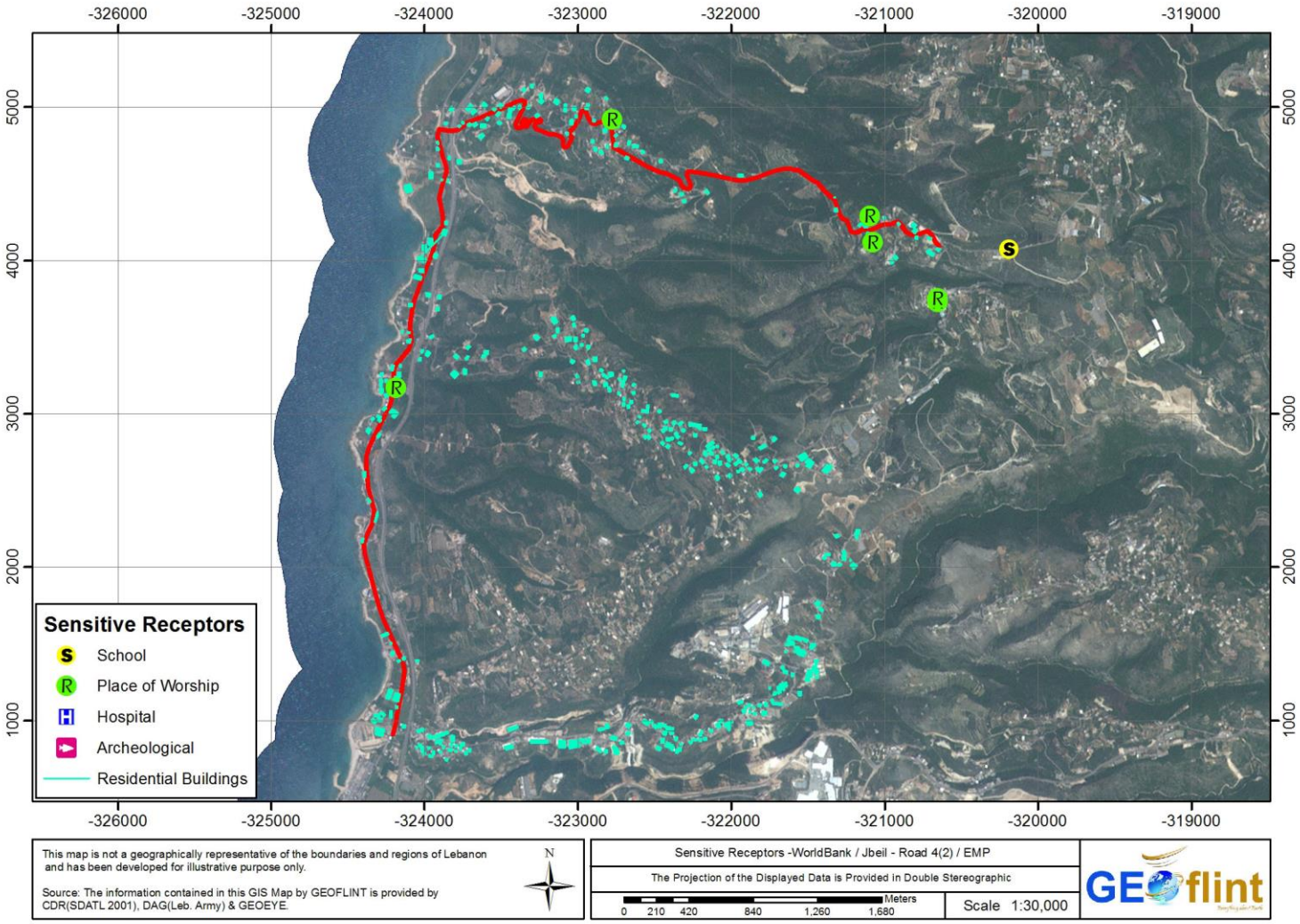
Source: Geoflint s.a.r.l. survey results, 2019

Figure R Closest sensitive receptors along Jbeil R3



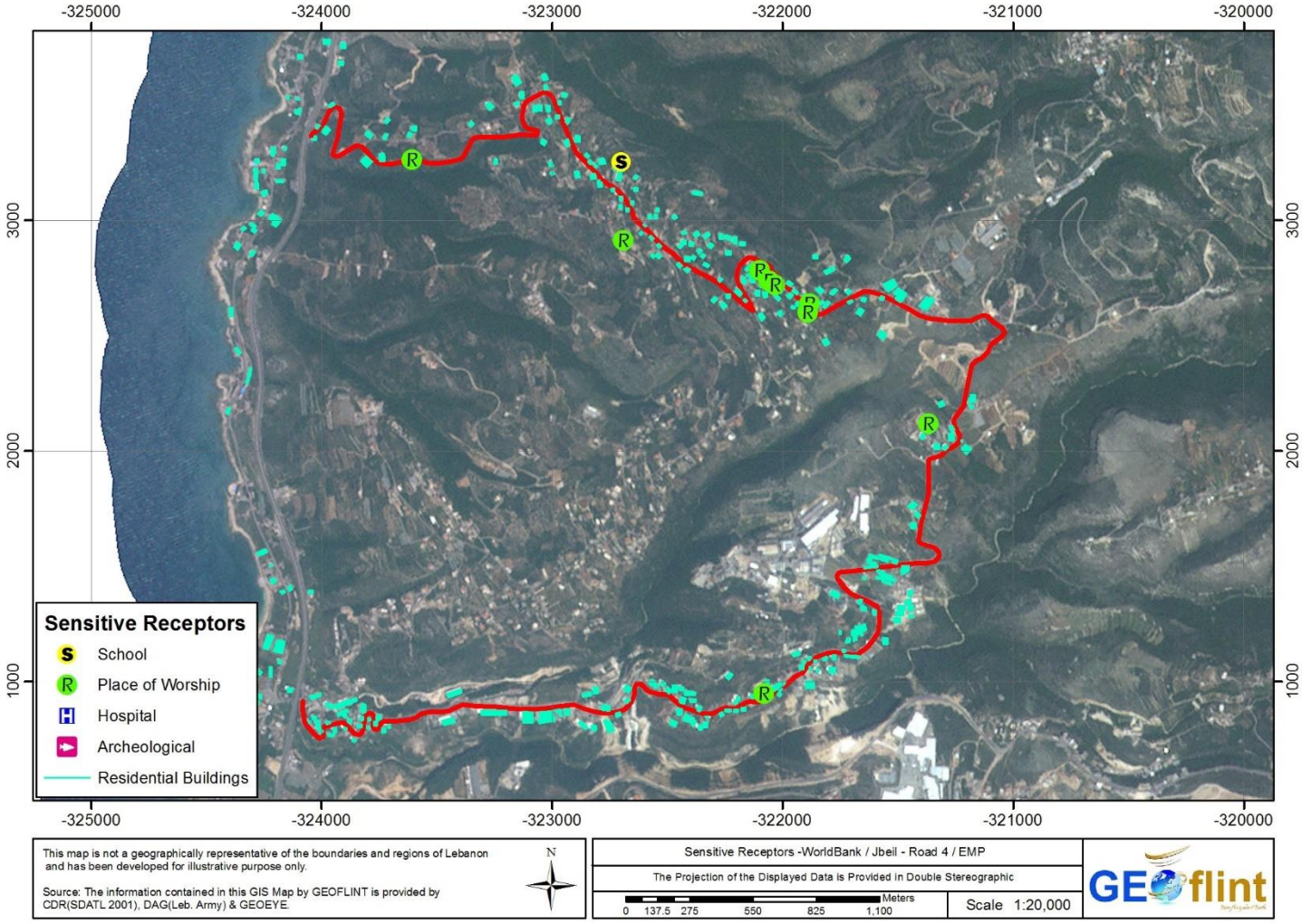
Source: Geoflint s.a.r.l. & Dar Al Handasah Nazih Taleb & Partners, 2019

Figure S Closest sensitive receptors along Jbeil R4 road (section 2)



Source: Geoflint s.a.r.l. & Dar Al Handasah Nazih Taleb & Partners, 2019

Figure T Closest sensitive receptors along Jbeil R4 (section 1)



Source: Geoflint s.a.r.l. & Dar Al Handasah Nazih Taleb & Partners, 2019

Figure U Distribution of ATC Stations throughout Jbeil R3 and Jbeil R4

Source: Dar Al Handasah Nazih Taleb & Partners, 2019

Table G ADT values for Jbeil R3

Caza	Road	Station	Direction	ADT (veh/day)
Jbeil	Road 3	JB3-1	Eastbound	2613
			Westbound	1875
		JB3-2	Eastbound	362
			Westbound	107

Table H Type of vehicles passing Jbeil R3

	Vehicle Class	Type	Percentage (%)
Jbeil R3	Class 1	Motorcycles	0.7
	Class 2	Passenger Cars	91.6
	Class 3	4-tire trucks	6.8
	Class 4	Buses	0
	Class 5	2-axle (6 tire trucks)	0.7
	Class 6	3-axle trucks	0.1
	Class 7	4+ axle trucks	0.1
	Class 8	3-4 axle single-trailer combinations	0.1
	Class 9	5-axle single-trailer combinations	0
	Class 10	6+ axle single-trailer combinations	0
	Class 11	5- axle multi-trailer combinations	0
	Class 12	6- axle multi-trailer combinations	0

	Class 13	7+ axle multi-trailer combinations	0

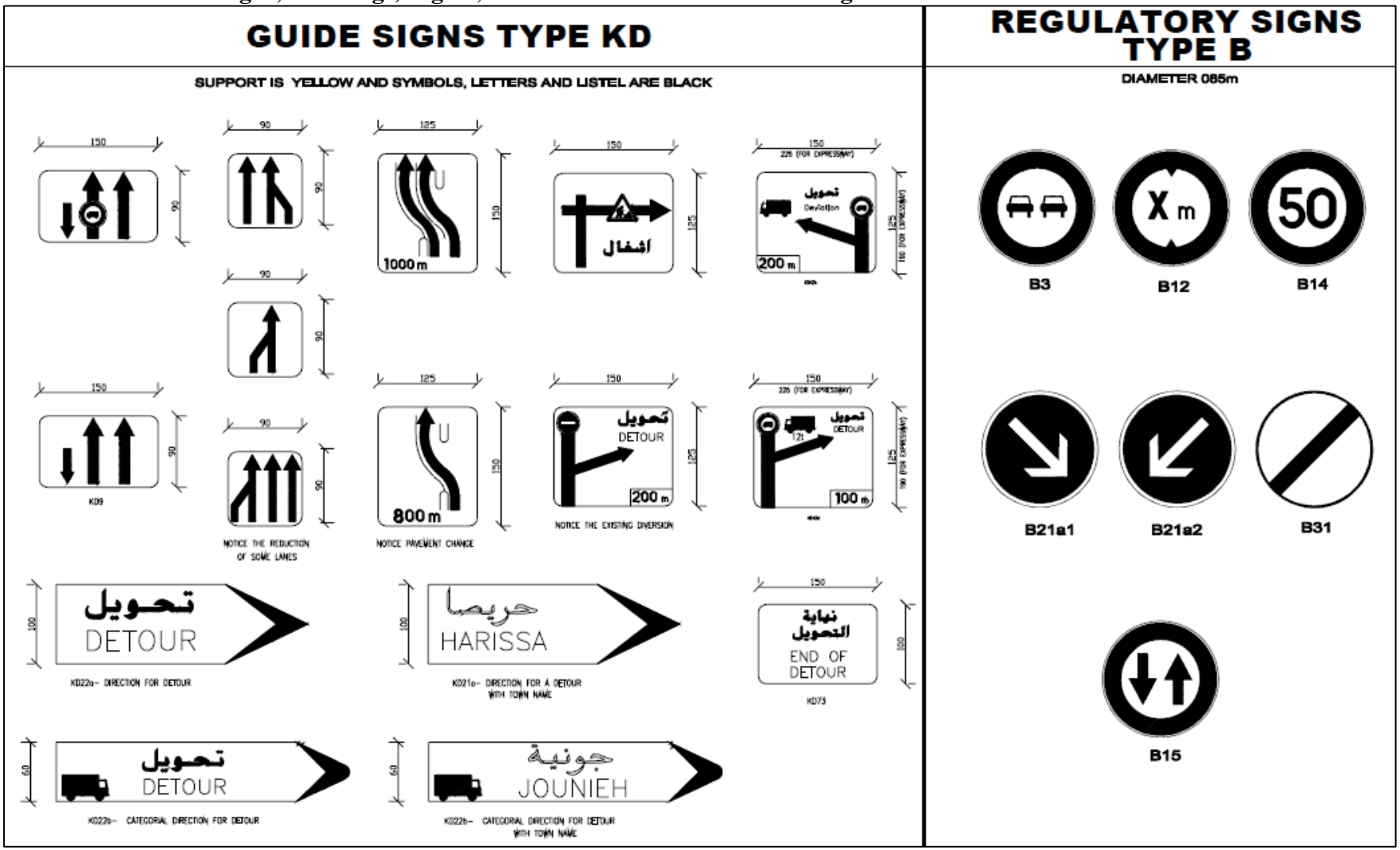
Table I ADT values for Jbeil R4

Caza	Road	Station	Direction	ADT (veh/day)
Jbeil	Road 4	JB4-1	Eastbound	1375
			Westbound	1361
		JB4-2	Eastbound	1304
			Westbound	323
		JB4-3	Northbound	646
			Southbound	1160

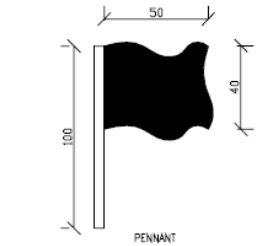
Table J Type of vehicles passing Jbeil R4

	Vehicle Class	Type	Percentage (%)
Jbeil road 4	Class 1	Motorcyles	4.4
	Class 2	Passenger Cars	88
	Class 3	4-tire trucks	3.9
	Class 4	Buses	0
	Class 5	2-axle (6 tire trucks)	2.3
	Class 6	3-axle trucks	0.6
	Class 7	4+ axle trucks	0.4
	Class 8	3-4 axle single-trailer combinations	0.2
	Class 9	5-axle single-trailer combinations	0.1
	Class 10	6+ axle single-trailer combinations	0
	Class 11	5- axle multi-trailer combinations	0
	Class 12	6- axle multi-trailer combinations	0.1
	Class 13	7+ axle multi-trailer combinations	0

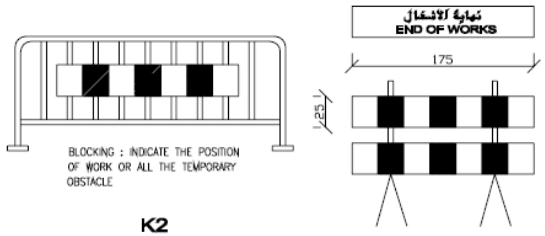
Annex 2: Road Signs, Markings, Lights, and Barricades to be Used during Rehabilitation Works



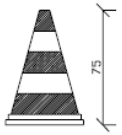
SIGNS TYPE K



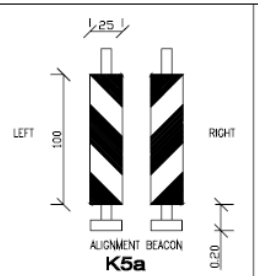
K1



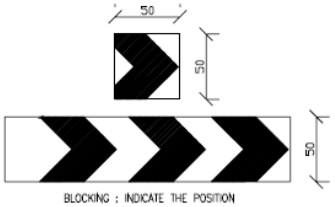
K2



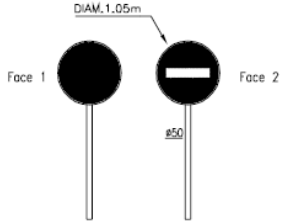
K5a



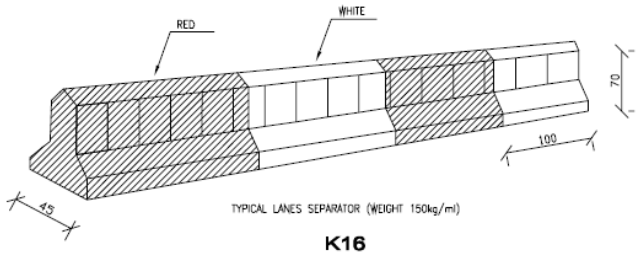
K5a



K8



K10a



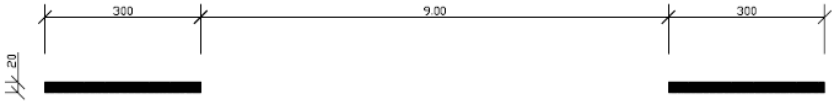
K16

TEMPORARY MARKING

THESE LINES ARE YELLOW AND REFLECTORISING.
THEY CAN BE ERASED OR REMOVED WITHOUT ANY RESIDUAL TRACE.

FOR CONTINUOUS EDGE LINE AND FOR SEPARATING THE TRAFFIC IN OPPOSITE DIRECTIONS

MR2 TEMPORARY

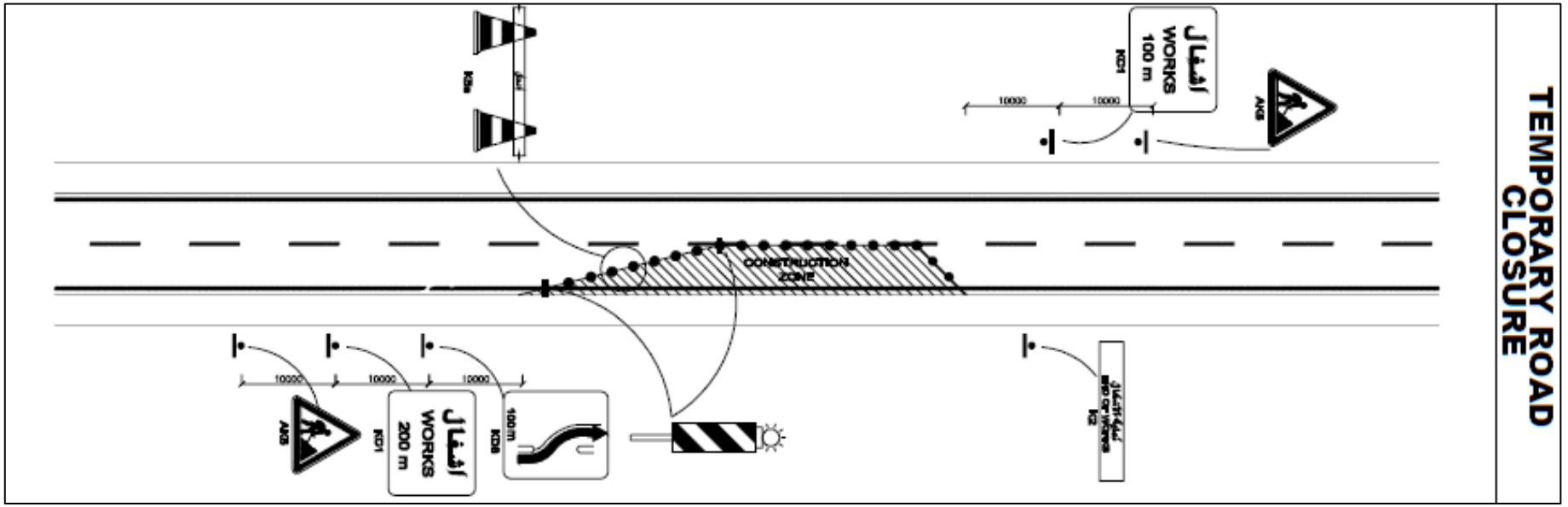


FOR SEPARATING THE TRAFFIC IN THE SAME DIRECTION

TYPE T1

FOR SEPARATING THE TRAFFIC IN THE SAME DIRECTION

TYPE T3


TEMPORARY ROAD CLOSURE
CONSTRUCTION ZONE
WORKS 100 m
WORKS 200 m
10000
10000
10000
10000
100 m

WARNING SIGNS TYPE AK

SIDE 0.70 m


AK2


AK3


AK4


AK5

AK3+KM1


AK14


AK17

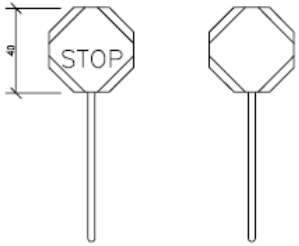

AK22

AK14+KM9+KM2
EXAMPLE

AK5+KM9

BY FLAGMEN

STANDARD SIGNS PADDLE



Annex 3: Code of Conduct

Table K Contractor Code of Conduct Form

Contractor Code of Conduct:

1. All employees, associates, and representatives commit to treating women, children (under the age of 18), and men with respect, regardless of race; color; language; religion; political or other opinion; national, ethnic or social origin; sexual orientation or gender identity; disability; birth or other status.
2. GBV constitutes acts of gross misconduct and is therefore grounds for sanction, which may include penalties and/or termination of employment. All forms of GBV are unacceptable, regardless of whether they take place on the worksite, the worksite surroundings, or off-site. In addition to the potential sanctions listed above, legal prosecution will be pursued, if appropriate, for any employees, associates, and representatives alleged to have committed GBV.
3. Demeaning, threatening, harassing, abusive, or sexually provocative language and behavior are prohibited among all company employees, associates, and representatives.
4. Sexual favors, making promises or favorable treatment dependent on sexual acts are prohibited.
5. Unless there is the full consent by all parties involved, sexual interactions between the company's employees (at any level) and members of the surrounding communities are prohibited. This includes relationships involving the withholding or promise of any kind of reward.
6. All employees, including volunteers and sub-contractors are expected to report suspected or actual GBV by a fellow worker, whether in the same company or not. Reports must be made in accordance with GBV allegation procedures.
7. All employees are required to attend an induction training course prior to commencing work on site to ensure they are familiar with the GBV Code of Conduct.
8. All employees must attend a mandatory training course once a month for the duration of the contract starting from the first induction training prior to commencement of work to reinforce the understanding of the institutional GBV Code of Conduct.
9. All employees will be required to sign an individual code of conduct confirming their agreement to support GBV activities.

I do hereby acknowledge that I have read the foregoing GBV Code of Conduct, and on behalf of the company agree to comply with the standards contained therein. I understand my role and responsibilities to prevent and respond to GBV. I understand that any action inconsistent with this Code of Conduct or failure to act mandated by this Code of Conduct may result in disciplinary action.

Company Name:
Signed by:
Title:
Date:

Table L Individual Code of Conduct Form

Individual Code of Conduct

- This individual Code of Conduct should be signed by all employees, from senior managers through the operational staff, and should also be required from any contractors working with the company.
- I, acknowledge that preventing gender-based violence (GBV) is important, and that preventing it is my responsibility. At [Company], GBV activities constitute acts of gross misconduct and are therefore grounds for sanctions, penalties or potential termination of employment. All forms of GBV are unacceptable, be it on the worksite, the worksite surroundings, or in the community. Prosecution of those who commit GBV may be pursued if appropriate.
- I agree that while working on the [Project], I will:
- Consent to a police background check.
- Treat women, children (persons under the age of 18), and men with respect regardless of race; color; language; religion; political or other opinion; national, ethnic or social origin; sexual orientation or gender identity; disability; birth or other status.
- Not use language or behavior towards women, children or men that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate.
- Not request or engage in sexual favors—for instance, making promises or favorable treatment dependent on sexual acts.
- Understand that unless there is the full consent by all parties involved, sexual interactions between the company's employees (at any level) and members of the surrounding communities are prohibited. This includes relationships involving the withholding or promise of monetary or non-monetary reward.
- Attend and actively partake in training courses related to HIV/AIDS and GBV as requested by my employer.
- Report through the GRM or to my manager any suspected or actual GBV by a fellow worker, whether in my company or not, or any breaches of this Code of Conduct.

Sanctions

[Company] has established a GRM for receiving, reviewing, and addressing allegations of GBV. If an employee has breached the Code of Conduct, the employer will take disciplinary action which could include:

- Informal warning
- Formal warning
- Additional training
- Loss of up to one week's salary
- Suspension of employment (without payment of salary), for a minimum period of one month up to a maximum of six months
- Termination of employment

In addition to the above, if warranted, [Company] will report the employee to the police as per local legal regulations.

I understand that it is my responsibility to use common sense and avoid actions or behaviors that could be construed as GBV or breach this Code of Conduct. I do hereby acknowledge that I have read the foregoing Code of Conduct, do agree to comply with the standards contained therein and understand my roles and responsibilities to prevent and respond to GBV. I understand that any action inconsistent with this Code of Conduct or failure to act mandated by this Code of Conduct may result in disciplinary action and may affect my ongoing employment.

Individual Name:
Signed by:
Title:
Date:

Annex 4: Public Consultation Notes, Presentation, Invitation Letters, and Attendance Sheets

Notes:

(1) Attendees were firstly concerned regarding their main role in this project and in monitoring any potential law violations by the contractor during the rehabilitation phase. Attendees mentioned that during previous projects, they faced problems with contractors dumping rehabilitation wastes near the rehabilitation site (e.g. valley and near rivers). They were worried to witness similar behavior during the REP project. In particular, they asked about the procedure of sending their complaints in case the contractor did not abide by the ESMP guidelines. In this context, the consultant and the representative of CDR explained that as head of municipalities their main role is to inform people about the project and at a later stage, they have a major role in assisting CDR in monitoring the contractor during project implementation. Any violation observed must be reported to CDR. Moreover, the representative of CDR explained to the concerned parties that:

- The project will include a grievance redress mechanism (GRM) that will register and address grievances and complaints from individuals and households who are affected by the project. Any complaints must be reported to CDR.
- Project monitoring and verification will be undertaken by CDR, the implementing agency, to ensure the project is being implemented in line with the proposed objectives (a supervisory consultant will be monitoring the contractor during the rehabilitation phase ensuring he is abiding by the ESMP). Moreover, it was explained that if the contractor did not comply with the set social and environmental guidelines, they will face penalties.
- Progress reports will be prepared by CDR to the Bank for review. Moreover, the World Bank will ensure continuous implementation support.
- World Bank specialists who are based in Beirut will have regular interaction with CDR. This will allow the Bank to perform continuous monitoring of works.

(2) The second main concern during the meeting was the coordination with relevant authorities, especially with respect to public works (i.e. wastewater and water infrastructure, etc.). The head of municipalities were worried whether there would be coordination among ministries and infrastructural institutions before the project implementation to avoid re-excavations of roads and further disturbances and pressures. In this context, the public was informed that CDR will ensure that a full coordination among municipalities and authorities prior to project execution.

(3) Third, local authorities present at the meeting were not satisfied about the selection of roads within the scope of REP. According to them, there are roads that are in greater need for rehabilitation. They asked about the selection process as they were not

consulted at the beginning of the project. In this context, the consultant explained that the government prioritized roads in Jbeil based on municipalities' official requests beside several technical criteria.

(4) Some technical concerns where revealed as well during the meeting including if the scope of work encompasses widening of existing roads and installing new drainage systems when needed. Moreover, one of the attendees asked if asphalting work will include a complete reconstruction of asphalt or only overlay and milling. The consultant explained that, when needed, a complete reconstruction of asphalt will take place and proper drainage systems will be installed.

(5) Finally, the vice president of the Union of Jbeil municipalities and all the attendees requested to have a copy of the contract that will be signed by the contractor as this will allow them to help CDR in the monitoring process. Accordingly, the CDR representative stressed that the municipality must send a formal request to CDR in this respect.

Photos

Public Participation meeting for Jbeil roads (building of the Union of Jbeil Municipalities)




1) Public Consultation Presentation

THE WORLD BANK

مشروع الطرق والعمالة في لبنان

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

REPUBLIC OF LEBANON
Ministry of Public Works & Transport
Directorate General of Land & Maritime Transport

خطة الإدارة البيئية والاجتماعية

قضاء جبيل

جلسة مشاركة العامة

GEOflint

DAR AL HANDASAH NAZIH TALEB & PARTNERS
دار الهندسة نزيه طالب وشركاه

نقاط حوار الجلسة

- المقدمة
- أهداف اللقاء
- الجهات المعنية بالمشروع
- وصف المشروع
- ماذا يتضمن المشروع خلال مرحلة التنفيذ؟
- الآثار البيئية والاجتماعية الإيجابية للمشروع
- الآثار البيئية والاجتماعية السلبية المحتملة للمشروع
- خطة الإدارة البيئية والإجتماعية
- أسئلة ومناقشة عامة

مقدمة

- تتمتع شبكة الطرق في لبنان بنطاق وتغطية كافيين بشكل عام
- لكن نسبة كبيرة من تلك الطرق في حالة سيئة وهو الأمر الذي يؤدي إلى إعاقة التنمية المحلية والاقتصادية، خاصة في المناطق الريفية التي تعتبر فيها حالة شبكة الطرق أدنى مستوىً من حالة الطرقات على المستوى الوطني ككل

مقدمة

- يخطّط مجلس الانماء والاعمار لتنفيذ مشروع الطرق والعمالة في لبنان عبر تمويل من البنك الدولي
- يشمل المشروع أعمال تأهيل عدة طرق في بلدات من كافة الأقضية اللبنانية
- يهدف هذا المشروع إلى تحسين كفاءة قطاع الطرق من خلال تحديد أولويات أعمال الطرق وتحسين تقنيات إدارة شبكة الطرق والسلامة العامة

1. أهداف اللقاء

- تحقيق الشفافية عبر إعلام الرأي العام بالمشروع لإبداء ملاحظاتهم وذلك وفقاً لسياسة ضمانات البنك الدولي (سياسة تشغيلية رقم 4.01)
- عرض لأهم الاثار البيئية والاجتماعية والتدابير التخفيفية المرتبطة بتنفيذ المشروع
- مناقشة خطة الإدارة البيئية والإجتماعية للمشروع التي تهدف لحماية الصحة البشرية، السلامة العامة والموارد البيئية

2. الجهات المعنية بالمشروع

الجهة	الصفة
البنك الدولي	ممول المشروع
مجلس الانماء والاعمار	إدارة وتنفيذ
دار الهندسة نزيه طالب وشركاه	استشاري هندسي
جيوفلنت ش.م.م .	استشاري بيئي

3. وصف المشروع

Road 3: 9.42 km

إده – كفر مسحون و دملصا – بنتاعل – الكفر و الحرف – بحديدات – كفون

3. وصف المشروع

Road 4: 18.6 km

ريحانه – حصرايل – غرزوز – شيخان – منصف

بعشتا – ريحانة – منصف – بربارة – بخعاز

4. ماذا يتضمن المشروع خلال مرحلة التنفيذ؟

الأنشطة خلال مرحلة التنفيذ:

- استبدال أو تأهيل طبقات الإسفلت بحسب نتائج اختبار من أجل إعادة تأهيل
- إعادة تأهيل شبكة تجميع مياه الأمطار عند الحاجة
- وضع إشارات السير وتخطيط الطرقات
- بناء جدران دعم وحاجز السلامة عند الحاجة

5. الآثار البيئية والاجتماعية الإيجابية للمشروع

مشاريع الطرق:

- تقلل أو تمنع الغبار، وتحسن التصريف، وتقلل العقبات المرورية
- تضمن سلامة الطرق وخاصة القريبة على المدارس والمحلات
- تحد من الحوادث المرورية
- تشجع الناس على الحفاظ على نظافة وأمانة أحيائهم
- ترفع قيمة الأراضي وتزيد الخيارات للأنشطة التجارية على طول الطريق

6. الآثار البيئية والاجتماعية السلبية المحتملة للمشروع خلال مرحلة التنفيذ

الآثار المحتملة على البيئة	التدابير التخفيفية
تلوث الهواء	• إستخدام آلات ذات انبعاثات منخفضة • توجيه مصادر الإنبعاثات بعيداً عن المساكن المحيطة • رش الطرق بإنتظام بالمياه لمكافحة الغبار • تغطية مركبات نقل المواد الأولية والمخلفات من وإلى موقع المشروع • تحديد سرعة الشاحنات والمركبات
تلوث المياه	• استخدام حواجز لمنع وصول الترسبات الرملية الى قنوات المياه • تغطية مواد البناء لتجنب غسلها إلى المسطحات المائية • تطبيق ممارسات ترشيد المياه من قبل عمّال البناء
تلوث التربة	• التأكد من صيانة المركبات والمعدات ومن عدم وجود أي تسرب للوقود • توفير أطقم في الموقع لمعالجة أي انسكاب عرضي على الفور • تعيين مسؤولين عن الممارسات الجيدة في الموقع بما في ذلك العلاج السريع لأي انسكاب عرضي
إنشاء المخلفات الصلبة	• تدريب الموظفين على إدارة النفايات • إزالة المخلفات الصلبة من الموقع خلال 24 ساعة، والتخلص منها في مكبات قانونية محددة.

6. الآثار البيئية والاجتماعية السلبية المحتملة للمشروع خلال مرحلة التنفيذ

الآثار المحتملة على المجتمع	التدابير التخفيفية
تغير في حركة السير	• التخطيط والتشغيل السليمين للتحويلات المرورية • إعادة تأهيل الطريق بشكل تدريجي • وضع علامات سير وأنظمة إضاءة في الأماكن الحساسة لضمان سلامة النقل
خطر على الصحة والسلامة المهنية والعامة (في حال حصول اي حادث)	• تطوير خطة للتأكد من إلتزام المقاولين بالمبادئ التوجيهية للصحة والسلامة المهنية • توفير المعدات المناسبة للحماية الشخصية • توفير التدريب على الصحة والسلامة المهنية للعمال • تتوفير إرشادات السلامة فيما يخص الأضواء والشرائط البرتقالية والبيضاء...
تأثر الحركة التجارية للمؤسسات والمحال القائمة على جانبي الطريق	• تسريع العمل من خلال الوضع والالتزام بأهداف ومقاييس واضحة لتقييم الأداء ومتابعة سير العمل • إعادة تأهيل الطريق بشكل تدريجي
الضوضاء	• حصر الأعمال في ساعة محددة ومصرح عنها سابقاً • صيانة دورية للمعدات وتجنب تعطلها • الحد من إستخدام الأجهزة والمعدات التي تسبب الضوضاء خصوصاً بالقرب من المنشآت الحساسة (المدارس وأماكن الصلاة)

6. الآثار البيئية والاجتماعية السلبية المحتملة للمشروع خلال مرحلة التشغيل

الآثار المحتملة على البيئة	التدابير التخفيفية
اضطراب الأنظمة الايكولوجية (زيادة مستويات التلوث الضوئي)	• استخدام مصادر الإضاءة الصديقة للطيور بدلاً من الأضواء الصناعية للطرق العامة
زيادة الجريان السطحي (Increased runoff) تسريب محتمل للمعادن الثقيلة	• إعادة تأهيل شبكة تجميع مياه الأمطار عند الحاجة
زيادة سرعة السائقين	• وضع إشارات المرور و تعيين الحد الاقصى لسرعة المركبات

7. خطة الإدارة البيئية والإجتماعية

هدف الخطة الادارة البيئية: مراقبة المشروع والتأكّد من مطابقته مع جميع المعايير البيئية.

بعد دراسة الاثار المحتملة للمشروع ،تقوم الدراسة باقتراح اساليب تخفيفية لهذه الاثار وسبل لمراقبتها.

خطة الادارة البيئية تتضمن:

- مراقبة نوعية المياه
- مراقبة نوعية التربة
- مراقبة نوعية الهواء
- مراقبة نوعية التنوع البيولوجي
- مراقبة الصحة والسلامة العامة
- خطة طوارئ في حال حدوث اي حادث مفاجئ.

أسئلة ومناقشة عامة

يمكنكم إبداء رأيكم

عبر التواصل مع شركة جيوفلنت ش.م.م.
هاتف: 05 954 662 /3/4
فاكس: 05 954 662 Ext. 108
بريد الكتروني: m.ballouk@geoflint.com

أو عبر التواصل مع وحدة مشروع الطرق والعمالة في مجلس الانماء والاعمار
هاتف: 01 980096 Ext. 317
بريد الكتروني: rstephan@cdr.gov.lb

شكـــــراً لحضوركم
ومشاركتكم

2) Public Consultation Invitation Letter

Geoflint s.a.r.l.
Cell. : 00961-3-219 059
Phone: 00961-5-954 662/3/4
Fax: Ext. 108
GF floor – center Mar Roukoz- Hazmeih
P.O.Box: 45 - 165
BEIRUT – LEBANON
website: www.geoflint.com

جيوفلنت ش.م.م.
خليوي: ٠٥٩ ٢١٩-٣-٠٠٩٦١
هاتف: ٦٦٢/٣/٤ ٩٥٤-٥-٠٠٩٦١
فاكس: مقسم ١٠٨
الطابق الأرضي - مروكز سنتر - الحازمية
صندوق بريد: ٤٥ – ١٦٥
بيروت – لبنان
شهاد تسجيل شركة رقم: ٢٣٩٢٢٦٤

الموضوع: دعوة لحضور إجتماع مشاركة عامة حول مشروع "الطرق والعمالة"

تحية طيبة وبعد،

بما أن مجلس الإنماء والإعمار يقوم بتمويل من البنك الدولي بتنفيذ مشروع "الطرق والعمالة" لتأهيل طرقات في جميع المحافظات اللبنانية، بإستثناء محافظة بيروت؛

ولما كانت تكلفت شركة دار الهندسة نزيه طالب وشركاه من قبل مجلس الإنماء والإعمار للقيام بالدراسات الهندسية والبيئية المتعلقة بالمشروع والتي بدورها كلّفت شركة جيوفلنت ش.م.م. للإستشارات البيئية بإعداد خطة ادارة بيئية وإجتماعية للمشروع المذكور؛

وحيث أنه برزت الضرورة لعقد اجتماعات تشاورية مع الجهات المعنية والعامة بشؤون البيئة والأمور الإجتماعية ذات الصلة بمشاريع الطرق والإستماع إلى آرائهم المتعلقة بالمشروع؛

وبما أن قضاء جبيل يتضمن طريقان من مجموع الطرقات الملحوظة للتأهيل في هذا المشروع؛

لذلك،

ندعوكم لحضور إجتماع مشاركة للعامة في تمام الساعة الرابعة بعد الظهرمن يوم الأربعاء الواقع في ١١ كانون الاول في مبنى إتحاد بلديات جبيل؛ ونتمنى على المواطنين الكرام، إبداء الملاحظات الخطيّة، في حال وجودها، حول المشروع المذكور، وإرساله إلى شركة جيوفلنت ش.م.م. بواسطة الفاكس على الرقم التالي: ٠٥/٩٥٤٦٦٢.

مدير شركة جيوفلنت ش.م.م.
خليل زين

3) Public Consultation List of Attendees

GEOflint

December 11 2019

Road Rehabilitation Project

Public Participation – Jbeil caza roads

قائمة حضور

الاسم	المنصب	البريد الإلكتروني	رقم الهاتف
ذاني ميرزا	مختار كفون		03297656
جوزيف ميرزا	مهندس مدني	J.Mirza@ach-lb.com	71/957911
ريتا اسطفان	مجلس الإنماء والإعمار	rstephan@cdr.gov.lb	03 940276
خالد صدقه	رئيس بلدية المنصف	municipality.monsif@g.mail	03/886685
ريتا الدكاش	مختار بخعاز	daccache.rita@hotmail.com	78/838903
ميشال ضومط خليفة	رئيس بلدية حصرايل	michelkhalife@hotmail.com	03/329959
بيار اده	رئيس بلدية اده	mpedde@yahoo.com	03/440001
ايلي جبر	مسؤول في اثار جبيل		03/412535
طوني الخوري	مختار دملصا		03/412386
شربل متى	مختار كفرسوت	Charbel-m-Matta.com	03508964
ناجي ادوار الهاني	دار الهندسة طالب	naji.hahne@gmail.com	03/313160

Annex 5: Complaint 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