

REPUBLIC OF CAMEROON
Peace-Work-Fatherland



Department of Environmental Engineering

REPUBLIQUE DU CAMEROUN
Paix-Travail-Patrie



UNIVERSITÀ
DEGLI STUDI
DI PADOVA

Department of Civil, Architectural
and Environmental Engineering

**EVALUATION OF ENVIRONMENTAL AND SOCIAL MANAGEMENT
PLAN: THE CASE OF THE ROAD CONSTRUCTION PROJECT TO ACCESS
THE KOUEKONG STADIUM LOT D-1 IN PREPARATION OF THE 2021
AFRICA CUP OF NATIONS IN CAMEROON**

*A thesis submitted in partial fulfilment of the requirements for the degree of Master of Engineering
(MEng) in Environmental Engineering*

PRESENTED BY

KWALI DENISE

Student Number: 15TP20955

SUPERVISED BY

Prof. NKENG George ELAMBO

CO-SUPERVISED BY

Prof. MARIA Cristina LAVAGNOLO

Academic Year: 2019-2020



DEDICATION

This work is dedicated to all researchers in the field who would use this work as a reference or
guide.

ACKNOWLEDGEMENT

During this five-year period of training in Environmental Engineering at the National Advanced School of Public Works Yaoundé, I have gotten to meet the best teachers and administrators which I will like to acknowledge. I will not finish my engineering training without thanking:

The **Almighty GOD**, for direction. He has been my source, defender, strength and provider all through my years of studies. Only His grace has seen me this far.

Prof. **NKENG George ELAMBO**: The Director of the National Advanced School of Public Works Yaoundé for providing a conducive working environment and for his academic follow-up throughout my cycle in this institution. His special role of supervision, orientation, leadership and wise counsels throughout has greatly encouraged me.

Prof. **TALLA André**: Head of the Environmental Engineering department of the National Advanced School of Public Works Yaoundé for his counsel, availability and mentorship without which this work will not have seen the light of day.

Prof. **Maria Cristina LAVAGNOLO**: For her special role of supervision, inspiring the new breed of Environmental Engineers from the National Advanced School of Public Works Yaoundé.

Mr. **MINGOH EMMANUEL MBAPAH**: Field supervisor for his hospitality, corrections, concern, availability, advice and mentorship throughout my period of fieldwork.

The Director of ESER contracting & industry INC.CO Bandjoun, Mr. **François BIKES** and the company's project supervisor Mr. **FONDOP Patrick**. Their leadership skills and work atmosphere contributed to the success of this work and I am so grateful.

My Work Colleagues and entire ESER staff who assisted me and gave me all they could do in their power to make sure I was able to do my work successfully.

My Lovely parents, **Mr. TANG OLIVER** and **Mrs. TANG GRACE** for their all-weather support morally, spiritually, physically and financially. They empowered me together with my siblings **CYNTHIA, KEVIN, NEVILLE** and **VANESSA**. Their encouragement made me ride on to attain this level.

My 2015 classmates in the Environmental Engineering, friends and well-wishers, your support has been of great importance in my life.

ABSTRACT

The main aim of this study was to contribute to the implementation of the Environmental and Social Management Plan (ESMP) for the access road to Kouekong Stadium in preparation of the upcoming Africa Cup of Nations in the West region of Cameroon. The company ESER in charge with the implementation phase proposed this execution document. In order to achieve this, we had to carry out documentary review in relation to the project, internet research, data collection through regular field works and observations using a guided environmental and social management identification form, Interview with senior staffs, technicians, and other stakeholders to collect information related to the environmental and social aspect of the project. Mitigation measures were proposed by the execution company ESER to reduce or eliminate impacts on the physical, biological and socio-economic aspect of the project during the execution phase. Our results demonstrated that not all the proposed measures were actually implemented during the execution phase. Some major impacts included the employment of local population within the project zone, sensitization on HIV, STD's and COVID-19 to create awareness of workers and local population. The company in the process to make the population have a better understanding of environmental issues such as waste management and climate change carried out environmental education. Another impact included economic boom, boost to some small and medium size companies around the project zone, capacity building to some local population in the domain of roadwork, exploitation of dumpsites for construction (depressed zones filled with earth). A major negative impact included the discontent of the population of Mifi due to delays in the payment of indemnities. They were found stranded and living in deplorable situations due to lack of homes. They were indemnified two (2) years after the start of the implementation phase of the project. The executing company implemented about 80 % of these proposed measures at the time of this work. Major difficulties encountered included administrative procedure to obtain authorization in time (authorization for blasting from the ministry of mines) and delays in the payment of work done. The mitigation measures were effective in some areas and in others lapses. In the areas where these measures were not effective, recommendation were made to reduce or eliminate these impacts.

Keywords : Environment, impact, mitigation measures, EIA, ESMP

RESUME

L'objectif principal de cette étude était de contribuer à la mise en œuvre du Plan de gestion environnementale et sociale (PGES) de la route d'accès au stade de Kouekong en vue de la prochaine Coupe d'Afrique des Nations (CAN) dans la région de l'Ouest du Cameroun. Ce document d'exécution a été proposé par la société ESER en charge de la phase de réalisation. Pour y parvenir, nous avons dû effectuer une revue documentaire en rapport avec le projet, une recherche sur internet, une collecte de données par le biais de travaux de terrain réguliers et d'observations à l'aide d'un formulaire d'identification de gestion environnementale et sociale guidé, entretien avec les cadres supérieurs, les techniciens et autres parties prenantes, recueillir des informations relatives à l'aspect environnemental et social du projet. Des mesures d'atténuation ont été proposées par la société ESER pour réduire ou éliminer les impacts sur l'aspect physique, biologique et socio-économique du projet pendant la phase d'exécution. Nos résultats ont démontré que toutes les mesures proposées n'ont pas été effectivement mises en œuvre au cours de la phase d'exécution. Certains impacts majeurs comprenaient le recrutement de la population locale dans la zone du projet, la sensibilisation des travailleurs et la population locale sur le VIH, les MST et le COVID-19. L'entreprise dans le but de mieux faire comprendre à la population les enjeux environnementaux tels que la gestion des déchets et le changement climatique a réalisé une éducation environnementale. Un autre impact comprenait l'essor économique, le renforcement de certaines petites et moyennes entreprises autour de la zone du projet, le renforcement des capacités de certaines populations locales dans le domaine des travaux routiers, l'exploitation des décharges pour la construction (zones déprimées remplies de terre). Un impact négatif majeur a été le mécontentement de la population de Mifi en raison des retards dans le paiement des indemnités. Certaines personnes se sont retrouvées sans logement et n'ont été indemnisés que deux (2) ans après le début de la phase de mise en œuvre du projet. Environ 80 % de ces mesures proposées ont été mises en œuvre par l'entreprise d'exécution au moment de ces travaux. Les principales difficultés rencontrées concernent la procédure administrative pour obtenir l'autorisation à temps (autorisation de dynamitage du ministère des mines) et les retards dans le paiement des travaux effectués. Les mesures d'atténuation se sont avérées efficaces dans certaines zones et dans d'autres, des manquements ont été observés. Dans les zones où ces mesures n'étaient pas efficaces, des recommandations ont été faites pour réduire ou éliminer ces impacts.

Mots clés : Environnement, impact, mesures d'atténuation, EIE, PGES

TABLE OF CONTENT

DEDICATION	i
ACKNOWLEDGEMENT	ii
ABSTRACT	iii
RESUME	iv
TABLE OF CONTENT	v
ABBREVIATIONS AND ACRONYMS	viii
LIST OF FIGURES	x
LIST OF TABLES	xi
GENERAL INTRODUCTION	1
CHAPTER 1.LITERATURE REVIEW	4
Introduction.....	4
1.1 PRESENTATION OF THE STRUCTURE ESER	4
1.2 PRESENTATION OF SITE PROJECT	5
1.3 DEFINITION OF CONCEPTS	5
1.4 GENERALITIES ON IMPACT	9
1.4.1 Impact Evaluation.....	10
1.4.2 Tools and methods for identifying, describing and classifying impacts.....	11
1.4.2.1 Checklist.....	11
1.4.2.2 Leopold digital matrix.....	11
1.4.2.3 Fecteau Matrix	12
1.4.2.4 Geographic Information Systems (GIS).....	14
1.4.2.5 Professional judgment.....	14
1.4.2.6 Environmental impact sheet.....	14
1.5 ENVIRONMENTAL IMPACTS OF ROAD MAINTENANCE.....	15
1.5.1 Impacts without the project:	15
1.5.2 Impacts during the works	16
1.5.3 Impacts after road project.....	16
1.5.4 Impacts due to the design of road works	16
1.6 IMPACT STUDIES IN CAMEROON	17

1.7 ENVIRONMENTAL IMPACT ASSESSEMENT (EIA), ENVIRONMENTAL AUDIT (EA) AND ENVIRONMENTAL NOTICE	18
1.7.1 Content or Report Of The EIA	18
1.7.2 Content Of The Audit Report	19
1.7.3 Content Of Environmental Notice	22
1.8 LEGAL, REGULATORY AND INSTITUTIONAL FRAMEWORK	23
1.8.1 Legal and Regulatory Framework	23
1.8.1.1. International conventions	23
1.8.1.2 Legislation Relating to Environmental Management.....	24
1.8.1.3 Legislation Relating to the Management of Forest Resources.....	26
1.8.1.4 Legislation Relating to the Protection of National Road Heritage.....	26
1.8.1.5 Legislation Relating to the Water Regime.....	27
1.8.1.6 Legislation Relating to Mineral Resources.....	27
1.8.1.7 Legislation Relating to Establishments Classified as Dangerous, Unsafe and Incommodity	28
1.8.1.8 Legislation Relating to Safety and Working Conditions.....	28
1.8.2 INSTITUTIONAL FRAME.....	29
Conclusion	30
CHAPTER 2.MATERIALS AND METHODS	31
Introduction.....	31
2.1 MATERIALS.....	31
2.1.1 Description of project zone.....	31
2.1.2 Project Location Map	32
2.1. 3. Biophysical Environment	33
2.1.4. Human environment	34
2.2 METHODOLOGY	35
2.2.1 Documentary review	35
2.2.2 Field Observation /Site visit	35
2.2.3 Internet.....	35
2.2.4 Interview.....	35
CHAPTER 3.RESULTS AND DISCUSSION	36
Introduction.....	36
3.1. ESMP ON PHYSICAL ENVIRONMENT	37
3. 2. ESMP ON BIOLOGICAL ENVIRONMENT.....	39

3.3. ESMP ON SOCIO-ECONOMIC ENVIRONMENT	40
3.4 IMPLEMENTATION OF ESMP AT THE BASE CAMP PK 2+225	42
3.4.1 Waste management.....	42
3.4.1.1 Different waste types identified at the base camp PK 2+225 -----	42
3.4.1.2 Collection and transfer to open dump pit -----	42
3.4.1.3 Waste hierarchy- Reduce-reuse and recycle.-----	44
3.4.1.4 Special waste -collection, transportation and fate-----	44
3.4.2 Recruitment	46
3.4.3 Tool box.....	46
3.4.4 Health and Nutrition of personnel	47
3.5 IMPLEMENTATION OF ESMP AT THE SITE.....	48
3.5.1 Earthworks.....	48
3.5.1.1 Watering of site against dust particle-----	49
3.5.1.2 Exploitation of dumpsite -----	50
3.5.2. Rock blasting at Cliff zone PK 10+500.....	51
3.5.3 Borrow Pit Exploitation.....	51
3.5.4 Circulation and Signalization	53
3.6 IMPLEMENTATION OF ESMP WITHIN THE PROJECT ZONE	54
3.6.1 Sensitization on HIV, STD's, COVID-19 as a social responsibility	54
3.6.2 Environmental Education	56
RECOMMENDATIONS.....	61
GENERAL CONCLUSION	63
BIBLIOGRAPHY	64
APPENDIX	67

ABBREVIATIONS AND ACRONYMS

AFCON: Africa cup of Nations

AIDS: Acquired Immunodeficiency Syndrome

BPU: Unit Price Schedule

CAMTEL: Cameroon Telecommunication

CAMWATER: Cameroon water Utilities Corporation

CAN: Coupe d’Afrique des Nations

CCAG: Cahier Des Clauses Administratives Générales

CCAP: Cahier Des Clauses Administratives particulières

CIE: Committee Interministeriel d’Environnement

CNSP: National Fire Brigade

CRC; Cameroonian Red Cross

CCTP: Cahier Des Clauses Techniques Particulières

DQE: Quantitative and Estimated Detail

EIA: Environmental Impact Assessment

EMP: Environmental Management Plan

ENEO: Energy of Cameroon

ESIA: Environmental and Social Impact Assessment

ESMP : Environnemental and Social Management Plan

Fig : Figure

GREEIEC : Guide de Réalisation et d’Evaluation des Etudes d’Impact Environnemental au Cameroun

HIMO : Haute Intensité De Main-D’œuvre.

HIV: Human Immunodeficiency Virus

HSE: Hygiene Security and Environment

ISO: International Standard Organization

MDC: Control mission

MINATD: Ministry of Territorial Administration and Decentralization

MINEE: Ministry of Energy and Water

MINEPDED: Ministry of the Environment, protection of nature and Sustainable Development

MINFOF: Ministry of Forests and Wildlife

MINMIDT: Ministry of Mines, Industry and Technological Development

MINSANTE: Ministry of Public Health

MINTP: Ministry of public works

MINTSS: Ministry of Labor and Social Security

ONR: National Risk Observatory

PGES : Plan de Gestion environnementale et social

PK: Point Kilometers

PM : Pour Memoire

PM: Prime Minister

PPE: Personal Protective Equipment

REC: Rainbow Environment Consult

SAMU : Emergency Medical Assistance Service

LIST OF FIGURES

Fig 1: Procédure de réalisation et d’approbation des rapports d’étude d’impact et audits environnementaux.	21
Fig 2: localization map.....	32
Fig 3: Plastic basket in office used for waste collection to metallic bin outside.....	43
Fig 4: Open dump pit at base camp for waste deposition	43
Fig 5: reused glass bottles to store fuel sample and empty 1.5L plastic (for buyam sellam).....	44
Fig 6: waste oil collection using metallic recipient and further transfer into 200L barren for storage using funnel and cup	45
Fig 7: Special waste type pending transfer to A) BOCOM and B) Société YN Métalcam	45
Fig 8: Toolbox talks on safety measures	46
Fig 9: Medical unit at base	47
Fig 10: Restaurant at base for the nutrition of personnel	48
Fig 11: A) Suspension, modification of access; B) run off channels due to earth works	48
Fig 12: A) Staircase and masonry walls for stabilization; B) slabs to access homes.....	49
Fig 13: Watering of site against dust pollution	50
Fig 14: Dumpsite exploited and leveled for construction	50
Fig 15: Compensation of affected persons after blasting with zincs to replace perforated ones	51
Fig 16: Borrow pit exploitation.....	52
Fig 17: Road signs to ease circulation.....	53
Fig 18: Accident due to over speeding.....	53
Fig 19: Demonstration of the use of condoms to the local population	55
Fig 20: Mitigation measures to fight against COVID-19 infection	56
Fig 21: Environmental Education at Government Technical school Tesse	57
Fig 22: Planting of trees by students to help fight against climate change and distributed bins for waste disposal.....	58

LIST OF TABLES

Table 1: Project presentation.....	5
Table 2: ESMP proposed be company on physical environment.....	37
Table 3: ESMP proposed be company on biological environment.....	39
Table 4: ESMP proposed be company on socio-economic environment.....	40
Table 5: Themes on environmental education	57
Table 6: Impacts associated with the various project activities and the mitigation measures during the mitigation phase	59

GENERAL INTRODUCTION

Environmental and Social Management Plan (ESMP)

Background

According to the World Bank (2020), an Environmental and Social Management Plan (ESMP) is a document that details the environmental and social protection requirements to mitigate and minimize the adverse impacts of a project. The purpose of the ESMP is therefore, to ensure that environmental and social impacts identified are effectively managed during the construction, operation and closure of the proposed project (Kurrent Technologies LTD, 2012). Following that, it acts as a quick guide for contractors and project implementers to enhance positive impacts and eliminate or minimize the occurrence of negative impacts through proposed mitigations measures. ESMP can equally be seen as important tools for ensuring that the management actions arising from Environmental Impact Assessment (EIA) processes are clearly defined and implemented through all phases of the project's life cycle (African Development Bank, 2018). The environmental and social management plan is not static but dynamic. This means the document can be updated at any time, based on additional information that may come up during the implementation phase. The specific objectives of an ESMP are as follows:

- Minimizing or eliminate any environmental, social and health impacts resulting from the project activities.
- Compensate for any loss of the affected persons
- Prevent environmental degradation as a result of project activities
- Ensure that the ESMP is feasible and cost-efficient
- Act as an action plan in order to ensure that the mitigation measures are properly implemented and monitored
- Ensure that all stakeholders concerns are addressed

Context and Justification

Cameroon was selected as the hosting country for the 2021 Africa cup of nations (AFCON). Due to the lack of adequate infrastructure to host such a competition, huge infrastructures are

being built in different parts of the country for the past two years such as hotels, hospitals, touristic sites, roads and stadia. Road construction in the framework of this project is part of sustainable development. The concept of sustainable development supposes that the need of the present generation be met without compromising the capacity of the future generation to meet their own needs. ESER contracting & industry INC.CO is the company responsible for the construction of the road LOTD-1 to access the kouekong stadium in preparation of this upcoming African Nation's cup. The project links two (2) national roads at Tobe N4(national road number 4) and Kouekong N6(national road number 6) in two (2) different divisions which are the Kongkhi and Mifi divisions respectively. This project is found in an ecologically sensitive zone with the presence of tributaries that empty themselves into river Noun and Lake Bougam.

ESER is implementing the proposed ESMP which was approved by the consulting firm (PRISMA SARL). In our studies, this ESMP was evaluated to check on its effectiveness during the implementation phase.

Problem

The construction of the access road to the Kouekong Stadium in preparation to the Africa cup of Nations will affect the environmental and social milieu through the different activities carried out during the implementation phase. This will include modification of the physical environment (soil, water, and air), the biological environment (fauna and flora) and the socio-economic environment.

General objective

The general objective of this study was therefore to evaluate the effectiveness of the mitigation measures that were proposed during the implementation phase by the company ESER in order to reduce or eliminate adverse impacts from activities.

Specific objective

- Review the proposed mitigation measures to address the potential impacts by the company;
- Verify the effectiveness of the implementation measures during the implementation phase to the related activities;
- Propose recommendation on lapses

Structure of the project

This thesis is divided into 4 chapters. Prior to these chapters is essentially the general introduction of the thesis and it provides for a brief notion on ESMP, explains the context and justification of the study, general and specific objectives and structure of this study. Chapter 1 is the literature review which highlights the definitions, past reported work on the topic, project presentation together with the legal, regulatory and institutional framework related to the project. Chapter 2 describes the study area and the research methodology. Chapter 3 examines the different activities, their impacts and mitigation measures. It also presents the discussions, results and recommendations. Finally, the last part gives us a conclusion to this study based on the results obtained and also includes references and appendix.

CHAPTER 1

LITERATURE REVIEW

Introduction

In this chapter, definitions, key concepts, laws and principles related to this study are presented to better address the problem mentioned above to achieve the research objectives.

1.1 PRESENTATION OF THE STRUCTURE ESER

ESER CONTACTING AND INDUSTRY CAMEROON INC.CO is a Turkish based company in Cameroon in the domain of public works. In 2018, the government of Cameroon through contract N ° 000019/M/PR/MINMAP/2018 contacted them by mutual agreement “marche gre à gre” to construct the access road to the Kouekong Stadium in preparation of the Africa Cup of Nations. This project is a 24 km stretch that cuts through two Divisions Kongh-Khi (Bandjoun) and Mifi (Bafoussam). ESER camp is located at Kayo about 3 km from the main road Tobe PK 0+000. The base is located at one of the highest altitudes in Bandjoun. The altitude permits an easy view of the town of Bafoussam and the lightening at the base can easily be spotted out at a very long distance due to its altitude. An area of 3 hectares belonging to the Bandjoun council and at a distance from water sources, homes and the road.

At the base camp are the various work units such as garage, fabrication zones, lodgings, offices, restaurants. The main source of energy is by use of a generator for electricity and a borehole for water supply for the base camp.

1.2 PRESENTATION OF SITE PROJECT

Table 1: Project presentation

Project	Execution of the access road to Kouekong stadium LOT D-1 in preparation to AFCON in Cameroon
Structure of contract	<ul style="list-style-type: none"> ▪ Contract N°000019/M/PR/MINMAP/2018 ▪ Execution time: 18 months ▪ Amount: 19 Billions (Budget special CAN) ▪ Consulting firm: PRISMA SARL ▪ Project Owner: MINH DU ▪ Executing company: ESER

1.3 DEFINITION OF CONCEPTS

- **Environment:**

It is defined as "all the natural or artificial elements and the biogeochemical balances in which they participate, as well as the economic, social and cultural factors which favor the existence, the transformation and the development of living organisms and human activities" (Law N° 96/12 of August 5, 1996 establishing the framework relating to the management of the environment in Cameroon).

- **Components of the environment:**

Essential constituents of the natural and human environment. These are usually the following elements: the socio-economic environment (health, employment, education, heritage, culture etc.), the physical environment (air, water, soil, climate, relief, etc.), the biological environment (fauna, vegetation) (Rainbow Environment Consult, 2008).

- **Risk:**

A situation that could harm people, society or the environment in the short or long term. The concept of risk is quantitative: it involves evaluating the probability, the percentage of occurrence and the severity of a hazard (Rainbow Environment Consult, 2008).

- **Environmental impact study:**

Systematic process of identifying, predicting, evaluating and reducing the physical and cultural effects of a large project that can significantly affect the natural, social or built environment. (Law N° 96/12 of August 5, 1996 establishing the framework relating to the management of the environment in Cameroon).

- **Environmental and social impact study (ESIA):**

According to article 2 (a) of Decree n ° 2013/0171 / PM of February 14, 2013 setting the modalities for carrying out ESIA's, it is a systematic examination aimed at determining the favorable and unfavorable effects likely to be caused by a project on the environment. A preventive tool for the protection of the environment and the rationalization of the exploitation of natural resources.

- **Environmental audit:**

Systematic, documented and objective evaluation of the activities of an entity, of an establishment's structure and facilities, of their operation and of their environmental management system in order to ensure the protection of the environment (Decree N°2013 / 0172 / PM of February 14, 2013 setting out the procedures for carrying out the environmental and social audit).

- **Environmental Assessment (EA):**

It is a systematic process of assessing and documenting the capacities and functions of resources, natural systems and human systems in order to facilitate sustainable development planning and general decision making, as well as anticipating and managing the negative impacts and consequences of development proposals in particular. The concept of environmental assessment tends today to be imposed to designate the entire process set in motion to ensure that the projects, policies or programs carried out or implemented in a given space, “contribute to protection and improvement of the environment or, in any case, do not contribute or as little as possible to its degradation (Pierre et al., 1999).

- **Environmental measures:**

This is a set of measures to be put in place during all phases and throughout the life of the project (before, during and after) for a harmonious integration of the project in its environment.

We have among others:

- Mitigation measures that avoid eliminate or mitigate the negative effects of a given negative impact.

- Optimization or improvement measures that optimize the positive effects of a positive impact

Sustainable development: According to the United Nations World Commission on Environment and sustainable development in the Brundtland Report (1987), development meets the needs of the present generation without compromising the ability of future generations to meet theirs. It is also the formula that aims to reconcile economic and social development, environmental protection and the conservation of natural resources, following three objectives: maintaining the integrity of the environment and the sustainable use of species and ecosystems, improve social equity and improve economic efficiency, for the benefit of present and future generations (Rainbow Environment Consult, 2008).

- **Waste**

Any residue from a production, transformation or use process that is abandoned or that its holder intends to abandon (substance, material, product, furniture, etc.) (RAIMBOW ENVIRONMENT CONSULT, 2008).

- **Pollution**

Direct or indirect introduction, by human activity, of a pollutant (physical, chemical or biological alteration) which causes discomfort or a nuisance (RAIMBOW ENVIRONMENT CONSULT, 2008).

- **Odor**

Emission in the air of gas from a fixed or mobile source perceived by an apparatus and having a harmful, unhealthy or inconvenient character.

- **Sound**

Any acoustic vibration having a level of intensity and duration likely to be harmful to public health or which excessively interferes with the enjoyment of life or property near its source.

- **Environmental monitoring**

Device by which the effects on the environment of a project are observed and analyzed in order to analyze the relevance of the measures put in place and, if necessary, take corrective measures (Rainbow Environment Consult, 2008).

- **Environmental Control**

Establishment of periodic or continuous controls or verifications, according to a predetermined schedule, relating to one or more environmental components. Monitoring is generally aimed at determining the degree of compliance with applicable requirements or at observing the status and trends of particular components of the environment over time (Rainbow Environment Consult, 2008).

- **Terms of reference**

Written document presenting the purpose and scope of the evaluation, the methods to be used, the standard against which performance is to be assessed or analyses are to be conducted, the resources and time allocated, and reporting requirements. Two other expressions sometimes used with the same meaning are “scope of work” and “evaluation mandate” (OECD/DAC 2002).

- **Effect**

Consequence of a project or action on the environment regardless of the territory that will be affected (Michel, 2002).

- **Emission**

Direct or indirect discharge, from point or diffuse sources of the installation, of substances, vibrations, heat or noise in the air, water or the ground. In the context of Climate Change Convention: “By emissions we mean the release of greenhouse gases or precursors of such gases into the atmosphere over an area and over a given period.

- **Environmental and social impact notice**

Report prepared on small-scale projects or establishments / installations that are not subject to an environmental and social impact study or an environmental and social audit, but which could have significant effects on the environment. (Décret N° 2013/0171/pm du 14 février 2013 fixant les modalités de réalisation des études d'impact environnemental et social).

- **Strategic environmental assessment or strategic environmental impact study**

Systematic, formal and comprehensive process for assessing the environmental effects of a policy, plan, program or multi-component project (Décret n°2013/0171/pm du 14 février 2013 fixant les modalités de réalisation des études d'impact environnemental et social).

- **Impact**

The positive and negative, primary and secondary long-term effects produced by an intervention directly or indirectly, intended or unintended (OECD/DAC 2002).

- **Evaluation**

The systematic and objective assessment of an on-going or completed project, program or policy, its design, implementation and results. The aim is to determine the relevance and fulfillment of objectives, development efficiency, effectiveness, impact and sustainability. An evaluation should provide information that is credible and useful, enabling the incorporation of lessons learned into the decision-making process of both recipients and donors. Evaluation also refers to the process of determining the worth or significance of an activity, policy or program. An assessment, as systematic and objective as possible, of a planned, on-going, or completed development intervention (OECD/DAC 2002).

1.4 GENERALITIES ON IMPACT

The environmental impact study is a tool used by the ISO 14001: 2015 standard to carry out a project life cycle analysis. Environmental impact studies on the biophysical and human environments are required for a majority of projects. They are necessary and obligatory for large-scale projects and usually accompanied by mitigation and / or mitigation and / or enhancement measures and / or compensatory formulas and / or conservation or restoration measures. An impact on the environment is the effect, for a given time and on a defined space,

of human activity on a component of the environment caught in its broad meaning (that is to say encompassing the biophysical and human aspects), in comparison with the probable situation if the project is not carried out. The analysis of the effects of the project on the environment is the central phase of any study impact. This analysis is made by superimposing the actions of the project on the environments affected and projection of possible effects on the characteristics of these environments. This task includes the identification of impacts on the natural and human environments and quantitative and qualitative assessment of these effects.

The impacts considered in projects are in particular those resulting from the following sources:

Clearance, tree felling, soil stripping;

- Earthworks and preparation of the road bed;
- Construction and paving of the road;
- Construction of engineering structures and hydraulic structures;
- Loans, quarries, collection and transport of materials, storage of spoil and embankments;
- Water withdrawals from dams and reservoirs;
- Transport of equipment to the site;
- Deviations;
- Influx and temporary installation of workers, the base camp, the power plant of coating (and other technical installations);
- Presence of improved road and parking areas;
- Traffic and transport (operation), road safety, maintenance and repair.

1.4.1 Impact Evaluation

Evaluating the impacts of a project on the environment is an essentially subjective act which consists in making a value judgment on the degree of influence that an activity will have on a component of the environment and on the importance of consequences throughout the project on the environment. It also aims to propose measures correctly relating to the impacts of a planned activity. This judgment is based on knowledge of the environment (measurements, observation, etc.), scientific knowledge and traditional expertise. The impact of a project results from the comparison between the initial state of the environment without the project and its final state (with the project). The initial state is the state of the environment just at the start of the work. The current state or reference state corresponds to the state of the environment at the

time the Applicant carries out the study. The final state corresponds to the state of the environment after the implementation of the project (Pierre et al., 1999).

The impact of a project at a given time and space is defined as the gap between the state of the environment without the project and the state of the environment with the project.

By environmental impact we mean the following aspects:

- The effects on the health and well-being of populations, the environment. Ecosystems (flora and fauna included), agriculture buildings (considers elements to be protected);
- Effects on climate and atmosphere;
- The use of natural resources (regenerative and mineral);
- Recycling and disposal of residues and wastes;
- Related aspects such as resettlement of populations, archaeological sites, landscape, monuments, as well as social implications and upstream, downstream and transboundary effects.

1.4.2 Tools and methods for identifying, describing and classifying impacts

In this part, we will give some tools and methods of identification, description, and analysis of impacts;

1.4.2.1 Checklist

It is a systematic way to identify and sort the potential social and environmental impacts of a project or activity. It also facilitates the identification of environmental factors that will be affected by project activities. It may be:

- **Simple:** that is, it is limited to an enumeration of the social and environmental parameters to be examined.
- **Complex:** that is, it is more structured in determining the importance and classification of impacts.

1.4.2.2 Leopold digital matrix

It is a table with two entries, which recites on the one hand the activities of the project in different phases and on the other hand the components of the environment (biophysical, human and socioeconomic). The different types of impacts can be characterized by marks or symbols. After identifying the impacts, it is possible to make descriptive comments on the different

interactions between the environmental component affected and the type of activity. It defines the interactions between the activities and the environment in the different boxes or intersections. Entries in the boxes highlight the severity of the impacts or other characteristics of the impacts. This matrix represents 88 environmental components on one axis and 100 actions on the other; potential impacts are marked with a diagonal line or cross in the corresponding boxes and can be assigned a numerical value to indicate their magnitude or importance. We mainly use the Leopold matrix to develop other less complex matrices.

1.4.2.3 Fecteau Matrix

It is a table with two entries which recites on the one hand the activities of the project in different phases, and on the other hand the components of the environment; then measure the impact on the basis of logical methods to give an appraisal value. It is used to assess one by one the most important interactions in the Leopold matrix based on the following indicators: the sensitivity of the element in the environment, the extent of the impact, the intensity and the duration of impact.

Characterization of impacts by the Fecteau matrix

The characteristics of the environmental impacts are variable. The main parameters considered for the characterization and evaluation of impacts are the nature of the impact, the intensity or magnitude, the extent or its location, the duration, the reversibility and the significance.

The main purpose of the Fecteau matrix being to characterize the impacts and to determine their importance, the parameters used most often are the intensity or magnitude of the impact, its duration and its extent.

a) Intensity or magnitude

The intensity of the disturbance depends on the severity of the changes observed in the component of the environment affected by an activity or the disturbances that will result from it. It is expressed in terms of severity (low, medium or major).

- A low intensity is associated with an impact causing only slight modifications of the affected component, calling into question neither its use, its characteristics, nor its quality.
- A medium-intensity impact causes disturbance to the affected component of the environment, which changes its use, characteristics or quality. The disturbances caused can be reversible over time.
- A high intensity results from an impact that leads to significant modifications of the environmental component. The degradation of the affected environment may be irreversible or may be reversible but over a very long period.

b) Duration

Impacts are short, medium or long term.

- A short-term impact: the disturbance is well circumscribed in time and ends with the end of the activity causing the impact. This impact is reversible. The affected environment naturally regains its balance after a period of time
- An impact of medium duration: here, the disturbance continues after the end of the activity. It is also reversible, but the re-equilibrium time of the affected medium is a little longer.
- On the other hand, a long-term impact is characterized by the notion of irreversibility. It is observed permanently or over a very long period on damaged environmental components.

c) The scope

It is possible to predict the geographic extent or area of impact for each site. Depending on the type of impact, the variation in magnitude must be assessed; for example: the extinction of plant species after felling. This is much easier for direct impacts but can also be for other impacts. The extent of impact refers to the radius of action or range, that is, the spatial distribution of the impact. Thus, an impact can be ad hoc, local or regional.

- An impact is one-off when its effects are very localized in space, that is, they are limited to a well-defined area of small size.
- An impact is local when it affects a larger area or population.

- An impact is regional when it reverberates throughout the study area and sometimes beyond. It can range from the village level to the district level, even the department or the region.

d) Importance:

Consists of making a value judgment on the degree of influence that an activity will have on a component of the environment and on the significance of the consequences of the entire project on the environment. It is determined from the combination of some of these indicators or criteria: duration, intensity and extent. Importance can be minor, medium, or major.

1.4.2.4 Geographic Information Systems (GIS)

GIS makes it possible to store, find, manipulate, and display data environmental issues on a map. The use of GIS in EIA is not within everyone's reach and is not yet widespread. The main obstacles are the lack of usable data and the cost of developing systems.

1.4.2.5 Professional judgment

Professional judgment is an informal method based on common sense and the experience of the expert. We rely on the knowledge of experienced professionals to identify, assess and analyze the impacts of a project / activity. The analysis is done here by transposition based on similar studies carried out in the past. These may or may not be in the same region, but in a similar environment. However, professional judgment can serve as a basis for building a good database and technical documents that can be used in several projects that have significant impacts on the environment.

1.4.2.6 Environmental impact sheet

The environmental assessment impact sheet identifies and describes each impact identified in the environment affected by the project. It is presented in the form of a table and is adapted according to each user. The description of environmental elements can be qualitative or quantitative. The first step is to identify the activity that is the source of the impact, the environmental component affected by this activity, give the impact a number and locate it in space. The other elements on the description of the impact are magnitude, importance and

significance. It is essential to propose mitigation measures in the impact sheet. The expert is also required to highlight the responsibilities, supervision, and monitoring instructions that will be considered in the ESMP. The impact sheet is closed with the characterization of the residual impact and the expert's commentary on the impact and the element of the environment affected (Ntep, 2012).

1.5 ENVIRONMENTAL IMPACTS OF ROAD MAINTENANCE

Maintenance operations do not present a major risk to the environment such as the displacement of populations or the disappearance of animal and plant species because the traces of the road already exist. However, they offer multiple opportunities to cause undeniable damage to the environment.

Although often modest in size, road maintenance operations are spread over the entire road network and are carried out regularly. It was therefore appropriate to integrate environmental and social concerns in the conduct of studies and works.

The impacts identified during the execution of road works can be grouped into four. Categories, namely:

- The impacts without the project
- The impacts during the execution of the works (direct impacts)
- Impacts after the project (indirect impacts)
- The impacts due to the design of the works.

1.5.1 Impacts without the project:

The impacts without the project result from the fact of non-maintenance. They mainly affect the physical, biological and socio-economic elements of the environment indeed; the impacts identified in the initial state of the road are as follows:

- Lung diseases detected among local residents;
- Regressive erosions;
- The deterioration of the living environment;
- Difficulties in accessing health services and large metropolitan areas;
- Difficulties in the movement of goods and people;
- The difficulties in acquiring basic products and goods requires;
- The deterioration of vegetation upstream and downstream of hydraulic structures;

- Population pressure on the exploitation of non-wood ... wood forest products (in forest areas).

We therefore notice that the non-maintenance of a road seriously affects biodiversity ... several of its components.

We therefore notice that the non-maintenance of a road seriously affects biodiversity in several of its components.

1.5.2 Impacts during the works

The impacts during the works, also called direct impact, result from the influence of project activities on the components of the environment. At the study level, these impacts are not noticeable. Given the nature of the work and the elements of biodiversity, these impacts will be caused by:

- The search for project inputs;
- Site facilities;
- The very nature of the work;
- The negligence of the site operators;
- The permanent presence of equipment and site personnel.

1.5.3 Impacts after road project

The impacts noted after the project, also called indirect or induced impacts result from the multiple functions of the road. Generally, these impacts are the most important because they persist as long as the road exists. Very often, they affect all components of biodiversity both positively and negatively.

1.5.4 Impacts due to the design of road works

Some maintenance impacts are due to insufficient or even failure to take into account, in the preparation of the execution of the works, the negative effects induced by the design flaws during the construction of the road infrastructure and observed during the execution of the works. the moment of their implementation (Ntep, 2012).

1.6 IMPACT STUDIES IN CAMEROON

Impact studies are prescribed in Cameroon by several legal texts, including in particular Law N°96/012 of 5 August 1996 on the framework law relating to the management of the environment. Decree 2005 / O577 /PM of February 23, 2005 sets out the procedures for carrying out environmental impact studies and Order n ° 0070 / MINEP of April 22, 2005 determines the different categories of operations whose performance is subject to an environmental impact study.

An environmental impact study is a systematic review to determine if a project has or not favorable or unfavorable effects on the environment. The document resulting from this review is the report of the environmental impact study that is subject to the appraisal of the parties involved in the project.

The impact study is carried out by the promoter or the project owner and is his responsibility. The promoter must therefore call on a consulting firm of his choice to carry out the impact study. The approval of an environmental impact study gives rise to an environmental compliance certificate (CCE), by the Minister in charge of the environment. The Ministry of the Environment examines the impact study report submitted to it by the promoter and decides whether to approve said report, after consulting the interministerial committee of the environment (CIE). The approval gives rise to the issuance of a certificate of conformity environmental. For establishments that are already operational, without an impact study prior to the date of signature of the decree cited above, an environmental audit (EA) is required.

By definition, an environmental audit is a systematic, documented and objective assessment of the instalment of an institution, its operation and its environmental management system in order to ensure the protection of the environment. The environmental impact study, like the environmental audit, is a process scientific and participative. The EIA makes it possible to predict, identify and assess the damaging consequences of projects on the environment (it is an evaluation carried out a priori to the start of the project's activities). EA (Environmental Auditing), on the other hand, is an ex post evaluation of activities already in progress.

EIA and EA are decision support tools; they have three main objectives;

- Help the public or private owner to design an environmentally friendly project.
- The audit must make it possible to see the level of compliance with environmental obligations, in accordance with laws and regulations;

- Inform the authority responsible for making the decision to authorize the project. Impact study or environmental audit provide it with the information enabling it to decide in full knowledge of cause.
- Inform the public and facilitate their participation in decision-making. The EIA / EA file is set to the disposition of the public, which makes known its observations, which the final decision will have to take into account.
- The impact study and the environmental audit can be summary or detailed. The list of operations racoons subject to one or the other category (summary or detailed) is set by! (Order N° 0070 /MINEP of April 22, 2005).

1.7 ENVIRONMENTAL IMPACT ASSESSEMENT (EIA), ENVIRONMENTAL AUDIT (EA) AND ENVIRONMENTAL NOTICE

The Ministry of the Environment and the competent Administrations monitor and assess the implementation of the environmental and social management plan (EMSP) technically approved reports. This monitoring-evaluation can lead to the adoption of additional corrective measure of the EMP, after consulting the CIE.

1.7.1 Content or Report Of The EIA

The content of the summary EIA report includes:

- the summary of the study in plain language, in French and in English;
- description of the environment of the project site and the region;
- the description of the project;
- the report of the field work;
- the inventory and description of the impacts of the project on the environment as well as the measures planned and estimation of corresponding expenditure;
- the approved terms of reference for the study;
- the bibliographical references relating thereto.

The content of a detailed EIA report includes:

- the summary of the study in plain language, in French and in English;
- the description and analysis of the initial state of the site and its physical and biological environment,

- socio-economic and human;
- the description and analysis of all the natural, sociocultural elements and resources susceptible
- to be affected by the project, as well as the reasons for choosing the site;
- the description of the project;
- presentation and analysis of alternatives;
- the reasons for choosing the project among the other possible solutions;
- identification and assessment of the possible effects of the implementation of the project on the environment
- the indication of the measures planned to avoid, reduce, eliminate or compensate for the harmful effects the environment project and the corresponding expenditure estimate
- the awareness and information program as well as the minutes of the meetings of concertation held with the populations, non-governmental organizations, unions, leaders and other organized groups affected by the project;
- the environmental management plan comprising the monitoring mechanisms of the project and its environmental monitoring and, where applicable, the compensation plan;
- terms of reference for the study;
- Bibliographical references.

1.7.2 Content Of The Audit Report

The environmental audit report includes the following:

- the presentation of the legal and institutional environmental framework applicable to the activities of the society;
- the presentation of the Company, including the organization and its environmental management policy;
- the presentation of the biophysical and socioeconomic environment of the unit's area of influence, including
- fauna and flora;
- the description of the site and the facilities;
- the description of the production process;
- description of the waste and the process of its disposal;

- the identification and analysis of the impacts of the company's activities on the environmental components (air, water, soil, human environment) and proposition of corrective measures;
- the investigation of the compatibility with laws, regulations and policies, identification of situations of non-compliance and proposal for a compliance measure;
- The development of an environmental management plan.
- Procedure for approving study reports
- Environmental impact and audits.

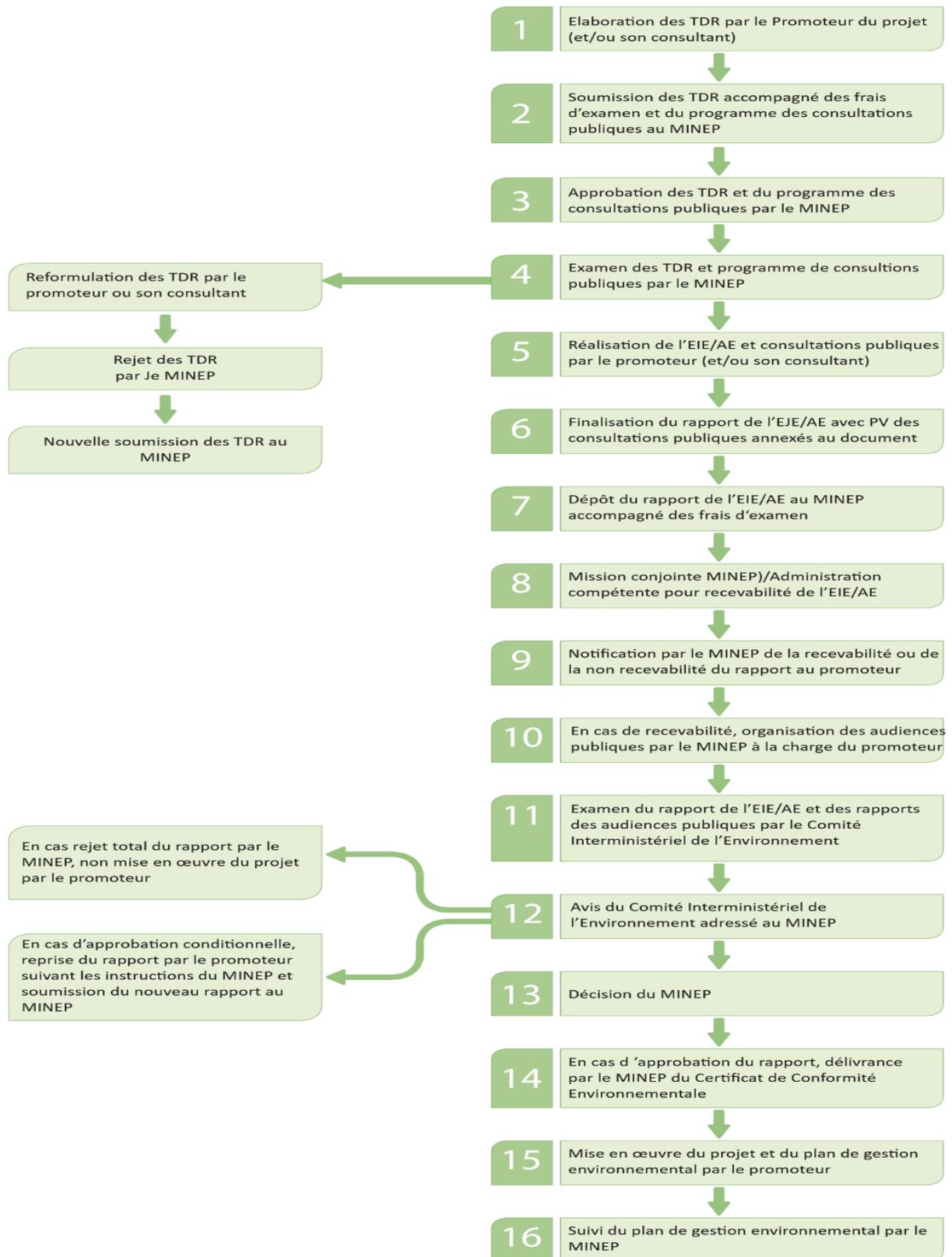


Fig 1: Procédure de réalisation et d’approbation des rapports d’étude d’impact et audits environnementaux.

Source : Manuel de procédure générale des études d’impact et audits environnementaux

1.7.3 Content Of Environmental Notice

The content of environmental and social impact study summarily (“étude sommaire”) includes:

- The summary of the report in plain language in French and English;
- The description of the environment of the site and the region;
- The description of the project;
- Review of the legal and institutional framework;
- The report of the descent on the ground;
- Inventory and description of the impacts of projects on the environment and mitigation measures considered;
- The terms of reference of the study;
- The environmental and social management plan;
- The bibliographical references relating to it.

The detailed environmental and social impact study (étude détaillée) includes:

- The summary of the report in plain language in French and English;
- The description and analysis of the initial state of the site and its physical, biological, socio-economic and human environment;
- The description and analysis of all susceptible natural, socio-cultural elements and resources to be affected by the project as well as the reasons for choosing the site;
- The description of the project and the reasons for its choice among the possible solutions;
- Review of the legal and institutional framework;
- The identification and evaluation of the possible effects of the implementation of the project on the environment natural and human;
- Indication of the measures planned to avoid, reduce or eliminate the damaging effects of the project on the environment;
- The awareness and information program as well as the minutes of the meetings held with people, non-governmental organizations, unions, opinion leaders and other organized groups concerned by the project;
- The environmental and social management plan including the project monitoring mechanisms and its environment and, where applicable, the compensation plan;

- The terms of reference of the study, as well as the bibliographical references.

The content of the environmental impact assessment includes, among others:

- The summary of the report in plain language in French and English;
- The description of the policy, plan or program and its alternatives;
- The description of the institutional and legal framework in relation to the policy, the Plan or the program.
- Identification of the main stakeholders and their concerns;
- Assessment of possible environmental impacts;
- The prescription of recommendations and relevant environmental management measures in an environmental management plan.

Any project that is subject of an environmental and social impact study, a strategic environmental assessment or an environmental impact assessment is subject to the administrative and technical supervision of the competent administrations. Administrative and technical monitoring relates to the effective implementation of the ESMP, in the environmental impact study, in the strategic environmental assessment and / or in the environmental impact rating and is the subject of a report. The promoter is required to produce a semi-annual report on the implementation of the environmental and social management plan, which he sends to the Minister in charge of the environment.

1.8 LEGAL, REGULATORY AND INSTITUTIONAL FRAMEWORK

In this part, we will talk about the legal, regulatory and institutional framework for the environment in Cameroon. The government of the Republic of Cameroon has equipped itself with legal texts relating to environmental protection. These texts apply fundamentally in all major infrastructure projects such as the construction of long-distance roads. The measures defined in our present ESMP have for some a binding aspect due to the requirements of the laws applicable on the national territory.

1.8.1 Legal and Regulatory Framework

1.8.1.1. International conventions

- Several regional and international conventions on environmental protection have been signed and ratified by Cameroon, including:
- African Convention of Algiers of 15/09/1968 on the conservation of nature and natural resources;

- United Nations Framework Convention on Climate Change (1992) and the Kyoto Protocol (1997);
- Convention N° 138 of the International Labor Organization (ILO) on the minimum age for admission to employment. It aims as a whole at the prohibition of child labor;
- Treaty on the conservation and sustainable management of forest ecosystems in Central Africa
- The Bamako and Basel conventions on toxic and hazardous waste Etc.

1.8.1.2 Legislation Relating to Environmental Management

Law N° 96/12 of August 5, 1996 on the framework law on environmental management sets the general legal framework for environmental management. This law lays down the principles for an ecologically sustainable implementation of the project. It is about:

- **The precautionary principle** according to which the adoption of effective and proportionate measures aimed at preventing the risk of serious and irreversible damage to the environment at an economically acceptable cost must not be delayed on the pretext of the lack of certainty due to knowledge scientists and techniques of the moment;
- **The principle of preventive and corrective action** against damage to the environment;
- **The polluter pays principle (PPP)**, according to which the costs resulting from pollution prevention and reduction measures, the fight against it and the rehabilitation of polluted sites must be borne by the polluter.
- **The principle of responsibility** which imposes on any person who, through their activity, creates conditions likely to harm human health and the environment, is required to ensure or have them insured disposal under conditions suitable for avoiding effects;
- **The principle of participation** according to which, public and private persons must in all their activities comply with the same requirements; decisions concerning the environment must be taken after consultation with the business sectors or groups concerned, or after public debate when they are general in scope; every citizen has the duty to ensure the protection of the environment and to contribute to the protection of it, and must have access to information relating to the environment. These principles will guide the company's activities throughout the life of the project. Articles 21 to 39

of this framework law relate to the protection of receiving environments which must be preserved from any form of degradation or contamination by toxic products during the implementation of projects. Thus, in terms of protection of the atmosphere, polluting emissions are prohibited and the emissions of noise and odors likely to harm human health constitute an excessive inconvenience for the neighborhood or harm the environment. The environment is subject to admissible limit values defined by joint texts of the Ministers responsible for the environment, public health, territorial administration and mines. Regarding waste management, Article 42 stipulates that in order to avoid any pollution of the environment, the waste produced must be treated in an environmentally sound manner in order to eliminate or reduce its harmful effects on human health, man, natural resources, fauna and flora, and on the quality of the environment in general. Several decrees and orders have been issued in application of this law. These include, among others:

- Decree N° 2013/0171/PM of 14 February 2013 setting the conditions for carrying out environmental impact studies.
- Order N ° 00001 / MINEPDED of February 08, 2016 setting the different categories of operations whose completion is subject to a strategic environmental assessment or an environmental and social impact study
- Law N° 98/015 of July 14, 1998 relating to establishments classified as dangerous, unhealthy or inconvenient; In its article 9, stipulate that second-class establishments must be the subject, before their opening, of a written declaration addressed to the Minister responsible for classified establishments, who decides, after consulting the other Administrations concerned, in accordance with the procedures set by way of regulatory
- Order N° 039 / MTPS / IMT of November 26, 1984 establishing general health and safety measures in the workplace; This text regulates the use of hazardous substances in the context of safeguarding health, hygiene and safety in the workplace.
- Order N ° 000831 MINMIDT on the nomenclature of classified establishments
- Decree N°. 2011/2583 / PM of 23 AUGUST 2011 regulating noise and odor nuisance Stipulate in its article 3 (1) that: the provisions of this decree apply to all types of noise, including noisy activities or work that annoys the neighborhood, establishments

classified as dangerous, unhealthy or inconvenient, noises produced inside mines and quarries, public and private worksites as well as mobile sources.

It also stipulates in its article 4 (1) that: the provisions of this decree also apply to all odors capable of producing odor nuisances having as chemical compounds: volatile organic compounds (alcohols and phenols, aldehydes and ketones, organic acids, esters, terpenes, amines, benzene compounds, non-cyclic hydrocarbons and reduced sulfur), ammonia and hydrogen sulfide.

1.8.1.3 Legislation Relating to the Management of Forest Resources

Law N° 94/01 of January 20, 1994 on the forestry, fauna and fishing regime generally establishes the protection of fauna and flora. Its Article 16 (2) stresses that any development project likely to disturb a forest or aquatic environment is subject to a prior environmental impact study. In accordance with this law, the national forest domain consists of:

- The permanent forest estate, which consists of land permanently assigned to forest and / or wildlife habitat (national parks, forest reserves, wildlife reserves, sanctuaries, FMUs, etc.);
- The non-permanent forest estate, which consists of forestland likely to be assigned to uses other than forestry and in which local populations are authorized to carry out their activities (agriculture, animal husbandry, community forestry, etc.).

Decree N° 95/531 / PM of 23 August 1995 sets out the modalities of application of the forest regime:

- Article 9 stipulates that "the clearing of a state forest can only be authorized after the said forest has been declassified for public utility, and presentation of an ESIA";
- Article 26 stresses that the exploitation of sand, gravel or laterite inside forests of the national domain must be carried out in accordance with the regulations on quarries, and after presentation of an ESIA; this is how it is decided that the company will prepare, prior to the operation of a rock or laterite quarry, an environmental protection plan for the site concerned that it will have approved by the MDC and the Owner.

1.8.1.4 Legislation Relating to the Protection of National Road Heritage

Law No. 96/67 of April 8, 1996 on the protection of the national road heritage, as amended by Law No. 98 of July 14, 1998, contributes to the protection of the environment by instituting

controls within the road framework relating to parts of automobiles, the defect of which is liable to degrade road infrastructure and the environment. The circular letter N ° 00908 / MINTP / DR on the Guidelines for taking environmental impacts into account in road maintenance, which follows on from the plan to limit the environmental impacts of road maintenance drawn up in 1997 by the MINTP, defines the environmental standards and practices to be observed, both during the construction of works and during the maintenance of paved roads and dirt roads.

This directive was recently supplemented by:

- The environmental and social management procedures for road projects;
- Procedures for the expropriation and resettlement of people displaced by road projects;
- Environmental directives for road works contracts.

1.8.1.5 Legislation Relating to the Water Regime

Law No. 98/005 of April 14, 1998 on the water regime sets the legal framework for the water regime and the general provisions relating to safeguarding the principles of environmental management and protection of public health, so:

- Article 4 prohibits acts, which could either alter the quality of surface or underground water or the sea, or harm public health as well as aquatic or underwater fauna and flora.
- Article 6 provides that any natural or legal person who owns an installation likely to cause water pollution must take the necessary measures to limit or eliminate the effects.

In accordance with this law, this ESMP presents some measures that the company will take on the site to avoid or simply manage effectively any contamination of water due to the discharge / voluntary discharge or not of used oils, hydrocarbons and coagulating products. Concrete not recommended.

1.8.1.6 Legislation Relating to Mineral Resources

Law No. 001 of April 16, 2001 relating to the mining code, which aims to govern mining activities, applies to the research and exploitation of mineral resources, including quarry substances. It prescribes some environmental protection rules, in particular:

- Prevention or minimization of any spillage into nature;
- Protection of fauna and flora;

- The restoration of disturbed sites to a stable condition of safety, productivity and visual appearance that is adequate and acceptable to the administrations responsible for Mines and the Environment.

The operation of the project's stone quarry will be carried out in accordance with the provisions of this law which also prescribes the rehabilitation of sites at the end of their operation.

Law N° 85/09 of 04 July 1985 relating to expropriation for public utility and to the terms of compensation sets the conditions for expropriation in the event that the State undertakes a realization of general interest.

Decree N° 00832 / 4.15.1 / MINUH / D 000 defines the terms of application of Law N ° 85/09 of July 4, 1985 concerning finished and unfinished constructions, setting out in detail the calculation bases the market value of buildings subject to expropriation for public utility (calculation rate by category of construction).

Decree N° 2003/418 / PM of February 25, 2003 fixing the compensation rates to be allocated to the owner victim of destruction for public utility of cultivated crops and trees, which fixes the compensation to be paid to owner's victims of destruction of their crops according to the type and age of the plants.

1.8.1.7 Legislation Relating to Establishments Classified as Dangerous, Unsafe and Incommodity

Law N° 98/015 of July 14, 1998 relating to establishments classified as dangerous, unhealthy or inconvenient governs, in accordance with the principles of sound management, establishments classified as dangerous, unhealthy or inconvenient. The following are subject to its provisions: factories, workshops, warehouses, construction sites, quarries and in general, industrial, artisanal or commercial facilities operated or owned by any natural or legal person, public or private, and which present or may present either dangers to agriculture, nature and the environment in general, or inconvenience to the convenience of the neighborhood.

The company's facilities whose operation is governed by this law will be the subject of a hazard study among other things.

1.8.1.8 Legislation Relating to Safety and Working Conditions

In Cameroon, the legal framework that governs all aspects of health, safety and working conditions applicable to industrial units, consists of the following laws and regulations:

- Law N° 64 / LF / 23 of 13 November 1964 on the protection of public health;
- Law N° 77/11 of July 13, 1977 relating to compensation and prevention of work accidents and occupational diseases;
- Law N° 92/007 of August 14, 1992 on the labor code;
- Law N° 98/020 of 24 December 1998 governing gas pressure and water vapor pressure devices;
- Order N° 037 / PM of March 19, 2003 establishing a national risk observatory;
- Decree N° 99/818 / PM of November 9, 1999 setting out the conditions for setting up establishments classified as dangerous, unhealthy and inconvenient;
- Order N° 039 / MTPS / LMT of November 26, 1984 setting out general health and safety measures in the workplace.

1.8.2 INSTITUTIONAL FRAME

At the institutional level, several ministries are involved in environmental management. In the context of this study, we can cite the following ministries:

- The Ministry of the Environment, Nature Protection and Sustainable Development (MINEPDED);

Body in charge of environmental management in Cameroon, MINEPDED through the sub directorates of Environmental Assessments and Environmental and Social Management Plans, is responsible for monitoring the implementation and approval of impact studies.

Environmental and social, as well as monitoring the implementation of management plans, impact studies and environmental audits.

- The Ministry of Forests and Wildlife (MINFOF); Government policy-making body for forests and wildlife
- The Ministry of Mines, Industry and Technological Development (MINMIDT); The Minister of Mines, Industry and Technological Development grants authorizations to set up and operate establishments classified as dangerous, unhealthy or inconvenient.
- The Ministry of Energy and Water (MINEE);

It is responsible for the control and management of water resources, authorizes the withdrawal of surface and groundwater for industrial or commercial purposes, the discharge of wastewater and the control of pollution of surface and groundwater.

- The Ministry of Public Health (MINSANTE)

Through its health promotion department and more specifically its hygiene and sanitation sub directorate, it must carry out, with industrial facilities and commercial establishments, missions to monitor the quality of conditions. General hygiene and sanitation at work in accordance with the legal framework on public health.

- The Ministry of Labor and Social Security (MINTSS);

Body responsible for monitoring the application of the labor code and international conventions, ratified by Cameroon, relating to work and therefore to the protection of workers in their workplace.

- The Ministry of Territorial Administration and Decentralization (MINATD); Indirectly involved because of the tutelage it exercises over decentralized local communities and civil protection. MINATD works with organizations such as:
 - The National Civil Protection Council (CNPC);
 - The National Risk Observatory (ONR): responsible for collecting, processing, storing and disseminating information on risks;
 - The Cameroonian Red Cross (CRC);
 - The Emergency Medical Assistance Service (SAMU);
 - The National Fire Brigade (CNSP).

Conclusion

According to a project's contract, the co-contractor will remain subject to the contractual documents of the contract in terms of environmental protection, in particular:

- The Book of Administrative Clauses (CCAP);
- The particular technical specifications (CCTP);
- The Unit Price Schedule (BPU) and the Quantitative and Estimated Detail (DQE);
- The General Administrative Clauses (CCAG);
- The work execution programs after approval by the Head of the contract's Department;

CHAPTER 2 MATERIALS AND METHODS

Introduction

In this chapter, the materials are presented which includes the study area (location map) describing the project zone. In addition, the different research methods used to evaluate the effectiveness of this environmental and social management plan proposed by the company are equally presented. They involve; documentary review, field observations, internet research and interview.

2.1 MATERIALS

2.1.1 Description of project zone

Administratively, the project is located in two divisions; the Mifi and Kong-khi divisions in the West Region Cameroon. The origin of the project (PK 0 + 000) is located at the TOBE and the end of the project (PK 22+ 300) is located at the Kouekong stadium in Bafoussam.

It is territorially delimited by the following subdivisions:

- in the North by Bafoussam 1st and Bafoussam 3rd;
- in the South by Demdeng and Bayangam
- to the east by Foubot, and,
- to the West by Bamendjou and Bafoussam 3rd

2.1.2 Project Location Map

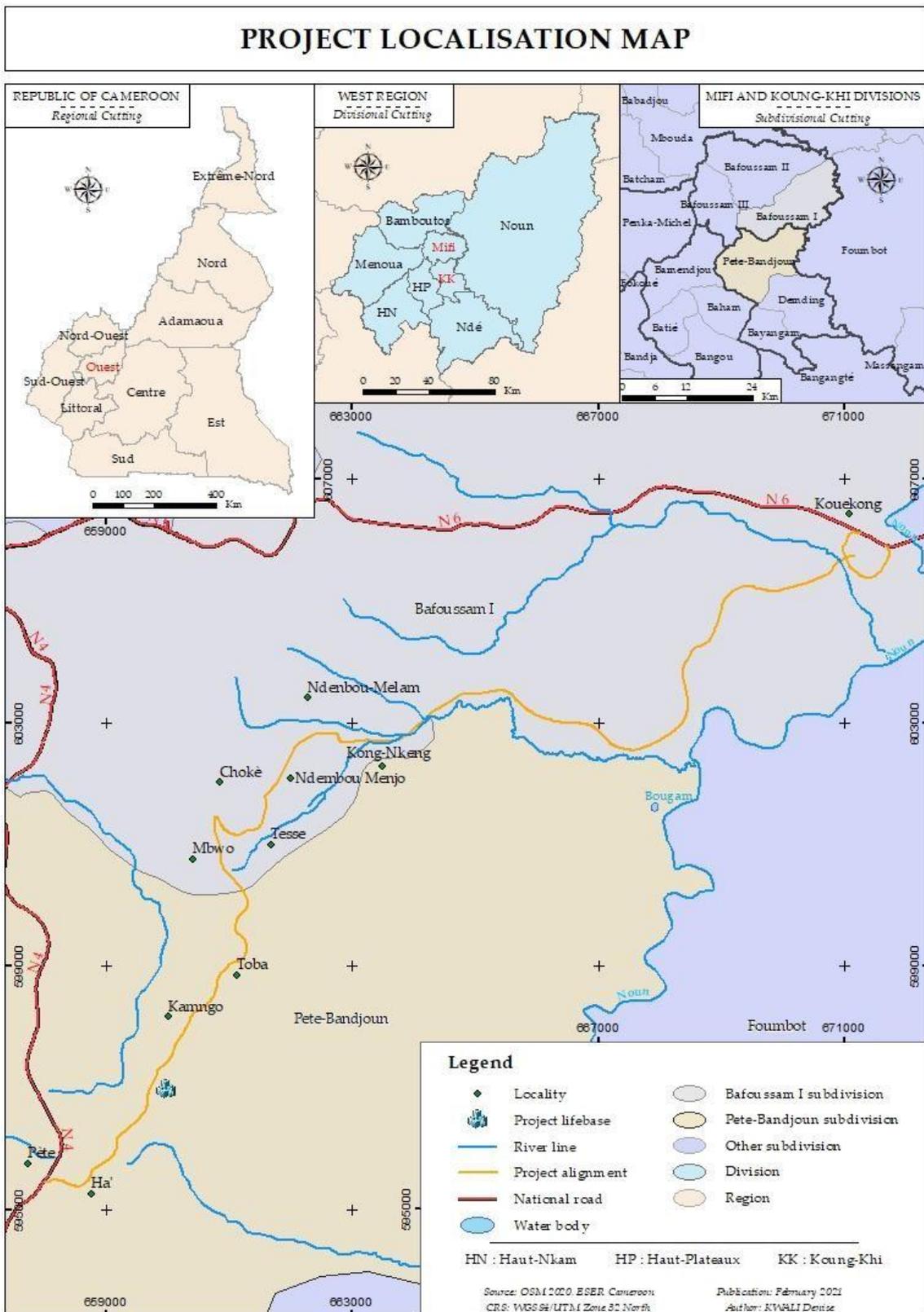


Fig 2: localization map
Source; ESER contracting

2.1. 3. Biophysical Environment

- **Weather**

Although located on the high plateau, in Pète - Bandjoun, we find an equatorial climate of the Guinean type and of the Cameroonian mountain type. The rains generally decrease from the coast towards the north and the interior of the country. Higher regions receive more precipitation than lower elevations. The rains are abundant there are 2300 to 4500 mm per year, with an annual average of 3000 mm. The climate is characterized by a short dry season (November - February). The prevailing wind during this period is the harmattan. The wet season lasts for eight months (March - October). August is the rainiest month while February is the hottest month. The annual average temperature is 26 °, 19 and the thermal difference is 10 °, 1.

- **Relief**

Here the subsoil is made up of Precambrian granites and gneisses, which are metamorphic and plutonic rocks covered on the surface by basaltic rocks. The average altitude is 1440 meters with peaks (Mount Mefo Ngotio and Mount Demné). There is an extension of the Noun plain.

- **Hydrography**

Numerous streams irrigate innumerable thalwegs and flow into the Noun which runs along the town in its south-eastern part. The most important are: the Nghuen which flows into the Noun in the east, the Nlemb which in some places serves as the border between the commune of Pète Bandjoun and that of Bafoussam I and which flows into the Mifi river.

- **Vegetation**

In the town of Pète - Bandjoun, we find the Sudanese savannah, and in places vestiges of the Guinean savannah. This is located in the immediate vicinity of the humid forest. It is therefore a mixture of unmanaged Source herbaceous formations and trees. The trees constitute a thick wooded area, and the herbaceous formations, a grassy bush. The Sudanese savannah on the other hand is a type of wooded savanna whose trees shed their leaves in the dry season to resist bush fires and drought. It is this savannah that gave birth to the term "Grass Fields".

- **Wildlife**

It is characterized by the presence of birds and small rodents (rats, squirrels, partridges, hedgehogs, etc.), the big game being endangered due to the very fact of the disappearance of the forest.

2.1.4. Human environment

- **History of Pète Bandjoun**

The council of Pète - Bandjoun was created in 1959 as a rural council of Pète Bandjoun.

It became a council of Pète - Bandjoun by presidential decree N ° 2007/117 of April 24, 2007 establishing the communities.

- **Population**

The Municipality of Pète - Bandjoun covers an area of approximately 115 km² for a population of around 47,405 inhabitants (extrapolation of the 2005 census results to 2011), or a density of 412 inhabitants / km². These populations populate 38 villages directed in the commune of Pète Bandjoun.

At the level of the municipal institution, the statistics used estimate 112,000 inhabitants.

- **Economical activities**

Economic activity in the municipality of Pète Bandjoun consists of agriculture practices, breeding, service offers and a weak industrial fabric.

Agricultural activities are mainly based on food crops (maize, cassava, macabo, plantain, beans, potatoes, peanuts, etc.) and market gardening (tomato, cabbage, etc.)

The cultivation of coffee suffers from abandonment by the populations of the commune of Pète Bandjoun due to the drop-in prices on the world market, the aging of the growers and plantations, and the reduction of production space in favor of food crops.

Traditional breeding is practiced by all sections of the population. We note the presence of a few modern production farms.

2.2 METHODOLOGY

The different methods that were used so as to evaluate the environmental and social management plan proposed by the company were; documentary review, field observations, constant site visits, internet research and interview.

2.2.1 Documentary review

Project contract between ESER and the Government of Cameroon was reviewed to identify the scope of the implementation of the safeguarded policies in the domain of environmental compliance.

Environmental and Social Management Plan of the company validated by the supervising authority PRISMA Sarl to identify the various activities, related impacts and the mitigation measures envisaged by the company for the project cycle

2.2.2 Field Observation /Site visit

This step consists of regular field observation using a guided environmental and social identification form to collect information on the physical, biological and social aspect of the project during the execution phase. The different work zones were visited and impacts identified from the various activities that are ongoing on the site and appreciation of mitigation measures.

2.2.3 Internet

Research on the internet was also employed to have more insight on the existing laws, legal and institutional framework that existed in the contract between the company and the government.

2.2.4 Interview

We contacted different stakeholders, departmental heads and local population to collect information related to the environmental and social aspect of the project. This includes the various activities in their domain, the related impacts and how mitigation measures are employed.

CHAPTER 3 RESULTS AND DISCUSSION

Introduction

In this chapter, the findings in the course of this study are presented. The different activities carried out by the company during the implementation phase had impacts on the physical, biological and socio-economic environment. The objective here is reviewing the proposed mitigation measures addressed by the company and to verify its effectiveness during the implementation phase at the company's base, site and quarry.

The table below summarizes the ESMP proposed by the company on the physical, biological and socio-economic environment.

3.1. ESMP ON PHYSICAL ENVIRONMENT

Table 2: ESMP proposed by company on physical environment

Components	Specific objective	Results	Activity	Implementation time	Actors	Verifiable indicator	Means of verification	Estimated cost
Ground	- Fight against modification of the soil's physical properties	compaction and loss in soil fertility	Rehabilitation of site by bringing in vegetative soils	After exploitation	company	N° of rehabilitation sites	- Reception form from MDC	PM
	- Fight against soil erosion - Reduce impacts due to soil pollution	- pollution by solid and liquid waste is reduced	- Emptying waste oil from vehicles with appropriate PPP - Waste bins at base and site	During the implementation phase	company	Number of sites developed to reduce the risk of pollution by solid and liquid waste - Number of bins present	control forms for the zones where waste oil is emptied site's news	PM

Water quality	<ul style="list-style-type: none"> - Fight against water pollution - Restore previous flows 	<ul style="list-style-type: none"> - chemical and physical pollution of water is reduced 	<ul style="list-style-type: none"> Opening of dump sites at a distance of at least 100m from site - Avoid throwing of liquid and solid waste in water 	During the implementation phase	company	<ul style="list-style-type: none"> - N° of open dump sites at a distance greater than 100m from water bodies - Respects Cameroonian norm 	Visual verification	Included in project's contract
Air Quality	<ul style="list-style-type: none"> - Reduce air pollution and pulmonary diseases caused by earth works 	<ul style="list-style-type: none"> -Atmospheric pollution by dust and other gases is reduced 	<ul style="list-style-type: none"> - Appropriate PPP; protective eye glasses, and face mask - Watering of site - Speed by vehicles respected 	Before the implementation phase	company	<ul style="list-style-type: none"> - watering of site at working zones - N° of cases recorded are treated 	<ul style="list-style-type: none"> - reports followed up and controlled by MDC - monthly reports on health 	PM
Nuisance	<ul style="list-style-type: none"> - Reduction of noise - During work 	<ul style="list-style-type: none"> -Risk of noise pollution 	<ul style="list-style-type: none"> Limit working hours from 7am6pm and check up on the engine of different vehicles 	During the implementation phase	<ul style="list-style-type: none"> - company - MDC 	<ul style="list-style-type: none"> N° of incoming report from local population 	<ul style="list-style-type: none"> - Reports controlled by MDC abs registered complains 	PM

3. 2. ESMP ON BIOLOGICAL ENVIRONMENT

Table 3: ESMP proposed by company on biological environment

Components	Specific objective	Result	Activity	Implementation time	Actors	Verifiable indicator	Means of verification	Estimated cost
Wildlife and vegetation	- Reduce destruction of natural vegetation and wildlife habitat	-Loss of vegetation is reduced - Few trees are cut down - Trees cut down are given out to the population for wood	- Opening of borrow pit sites where less trees will be cut down or vegetation destroyed Cutting of trees allowed only where necessary	During the implementation phase	Company and MINFOF	-Few trees cut down -Some trees planted	-Monthly report on environmental control -Contract report from MDC	PM

3.3. ESMP ON SOCIO-ECONOMIC ENVIRONMENT

Table 4: ESMP proposed by company on socio-economic environment

Components	Specific objective	Results	Activity	Implementation time	Actors	Verifiable indicator	Means of verification	Estimated cost
Public Health	- Reduce the spread of HIV/AIDS and STD's	Company's personnel and local population sensitized on dangers of HIV/AIDS	Sensitization Campaigns	before the implementation phase	- MDC, - Company's nurse	N° of recorded cases before and at the end of site works	Report controlled by MDC	PM
Traffic, risk of accidents during circulation	- Improve on circulation and reduce accidents	Security for different road users and circulation improved	- presence of road signs along working zones	During the implementation phase	Company and MDC	- Absence of Traffic - N° of recorded accidents	Follow up report by MDC	PM

Population and community life	- Ameliorate economic conditions	Employed youths from the project zone	Youths recruited	During the implementation phase	company	N° of youths engaged from quarters	Rapport from Environmentalist	PM
	- Avoid conflicts between company's personnel	Conflicts avoided	- Elaboration on the internal rules on good morals and habits - Sensitization of personnel	Before the implementation phase	- MDC - company	N° of conflicts avoided or resolved	Follow up report from MDC	PM
	- Facilitation of access	Local population easy have access to their homes	Sensitization of local population	During the implementation phase	Company and local population	N° of access set up	Visual verification and reports by MDC	

3.4 IMPLEMENTATION OF ESMP AT THE BASE CAMP PK 2+225

Here, we are going to present the various activities and the related impacts alongside mitigation measures employed by the company.

3.4.1 Waste management

3.4.1.1 Different waste types identified at the base camp PK 2+225

There are different types of waste generated from offices, dormitories, garage, kitchen and health unit at the base camp. This included;

- Residential waste (Kitchen waste, garden and yard waste, household waste)
- Special waste (Scraped tyres, healthcare waste, waste from electric or electronic equipment, Sewage, sludge)
- Hazardous waste are equally generated at the base (waste that has substantial or potential threats to public health or the environment (waste oil from vehicles and heavy duty machines) and need special way of treatment.

3.4.1.2 Collection and transfer to open dump pit

Waste from offices and restaurant was collected using adapted baskets and emptied into metallic waste bins which were further transferred into an open dump pit. The treatment at open dump pit include burning to reduce the quantity of the waste. When the pit got full, it was filled with vegetative soils and abandoned for another site. The HSE identified a new site while considering the area with low water table (this is done using mare judgement) and existing installation plant. The design of the pit was such that priorities were given horizontally about five (05) meters long and 1 to 2 meters deep. This was done to avoid getting contact with water table.

A



B



Fig 3: Plastic basket in office used for waste collection to metallic bin outside



Fig 4: Open dump pit at base camp for waste deposition

3.4.1.3 Waste hierarchy- Reduce-reuse and recycle.

Reduced waste included waste papers for printing of internal and working documents, used bottles from restaurant to store fuel samples for upward studies, collecting 1.5L used plastics to send them to market women who retail red oil, used cartons to people who sell eggs,

A



B



Fig 5: reused glass bottles to store fuel sample and empty 1.5L plastic (for buyam sellam)

3.4.1.4 Special waste -collection, transportation and fate

Special wastes were given special attention on their treatment as per the ESMP. The company have signed a convention with BOCOM international in Douala. BOCOM International has the authorizations from the government to collect, transfer and treat special waste such as waste oils, battery, filters from the company. Used oils from vehicle fleets are stored in 200 liters barren, transfer to BOCOM through public transportation means. This process was done using waste management manifest signed by the delegation of environment within the project zone. Upon arrival, the discharged of this manifest was signed by BOCOM and a copy sent to the ministry of environment in the receiving zone.

Used tyres were equally given special attention in their management. Société YN Metacam Sarl collected them regularly with authorization from the ministry of environment for recovery of waste tyres.



Fig 6: waste oil collection using metallic recipient and further transfer into 200L barren for storage using funnel and cup



Fig 7: Special waste type pending transfer to A) BOCOM and
B) Société YN Métalcam

3.4.2 Recruitment

Recruitment by the executing company ESER, was based on the Law 92/007 of August 14, 1992 on the labor code and also the national collective convention on public works enterprises. The company recruited people on the different posts of responsibility like the senior staffs and technicians through competitive interviews. The company equally employed maneuvers for the different tasks that needed highly intensive labor force (HIMO) in accordance with article 17 of the project's contract. This made it possible for most of the youths within the project zone to be recruited. Subcontractors (for nutrition of personnel and construction of water channels) within the project zone were also recruited.

While the work was in progress, income was generated which resulted to an improvement in the living conditions of these workers and their families. This led to the reinforcement of rural savings and the creation of micro projects thereby improving on the socioeconomic development of the region.

3.4.3 Tool box

Once a week, workers were grouped at the assemble point and briefed on safety measures and other internal issues of concern during tool box. In addition, this activity was equally enhanced by regular checks at different work posts and in situ talks the HSE department.



Fig 8: Toolbox talks on safety measures

Adapted personal protective equipment were equally given to personnel and they were sensitized for their different uses and the importance for their safety. The PPE distributed included; Security helmet, Safety shoes, Safety Jacket, Gloves, Safety glasses, Ear protection.

3.4.4 Health and Nutrition of personnel

First aid services were carried out by the health unit in-situ at the base camp. This included clinical diagnosis by a state registered nurse and the administration of basic drugs. The nursing room was equipped with kits to carry out in situ test such as malaria, typhoid, glucose level, rapid hepatitis A&B, HIV and also rest bed for administration of drips. Other health issues such as diarrhea, abdominal pain, gastric, headaches, catarrh etc are frequently diagnosed and are equally handled by the nurse. The company had signed a convention with Government hospital Nja in Bandjoun such that situations that cannot be handled at the base are referred to the hospital for health diagnosis. The supply of medicines at the base was done by “3NPMHERMADISTRISarl” from Bafoussam.



Fig 9: Medical unit at base

A subcontractor recruited with installation at the base camp served nutrition for local personnel. The company has equally put in place a trained cook from Turkey for nutrition of Turkish personnel and senior staff. The HSE carried regular checks on the food supplied. Feeding at the base camp was done thrice a day; breakfast, lunch and dinner enabling proper feeding of the personnel.



Fig 10: Restaurant at base for the nutrition of personnel

3.5 IMPLEMENTATION OF ESMP AT THE SITE

3.5.1 Earthworks.

Earth works involves the movement of the earth; be it cutting or filling using heavy duty machines. This activity at the site was related to some environmental and social impacts such as: suspension of homes, modification of accesses to homes and quarters, modification of run off channels (sometimes led to flooding if mitigation measures were not appropriate), compaction of top soil, destruction of secret sites, blasting of rocks along the itinerary, obstruction of circulation due to dust particles, environmental nuisance due to noise and vibrations etc.

A



B



Fig 11: A) Suspension, modification of access; B) run off channels due to earth works

These impacts often led to social conflicts and so, had to be addressed properly with the most appropriate mitigation measures such as: the provision of slabs to access homes, providing alternative means or building staircases to access suspended homes, masonry walls, watering of site to reduce dust particles, signalization using road signs, provision of financial means to the concerns for displacement of secret places, indemnities of properties destroyed etc.



Fig 12:A) Staircase and masonry walls for stabilization; B)slabs to access homes

3.5.1.1 Watering of site against dust particle

Most of earthworks activities raised a lot of dust particle within the project zone. However, ESER had mobilized water tankers to water the sites especially habitable and work zones; This was done to reduce dust pollution and equally improve on visibility especially during the dry season. Water was gotten from different running streams within the project zone with necessary measures to reduce pressure and conflict with local users. Again, dust masks were shared to the local population and workers from inhaling dust and fume particles that causes respiratory diseases.



Fig 13: Watering of site against dust pollution

3.5.1.2 Exploitation of dumpsite

Dumpsites are sites that receive excavated and waste materials from earthworks. These sites were identified and negotiated by the HSE department while considering environmental and social factors such as the distance from rivers, streams, homes, and other social infrastructures. Agriculture being one of the most important activities in the project zone, land was valorized for agricultural use and therefor areas of priorities used for the dumping of these materials were large depressions and valleys. At the end of exploitation, rehabilitation was carried out for agricultural purposes or either leveled to make a platform for constructions.



Fig 14: Dumpsite exploited and leveled for construction

3. 5.2. Rock blasting at Cliff zone PK 10+500

Rock blasting involve breaking of rock into fragments by the use of explosives. This activity can have negative impact such as; destruction of properties, nuisance from noise, earth trembling which sometimes affects foundations, death of both animals and human when sensitization and information circulation is not properly carried out. Prior to this activity, the company prepares correspondence letter to inform law and security forces concern, the chief of Bafoussam, headquarters and equally deploy HSE department to ensure home-to-home sensitization. At the end of the activity, a site visit was carried out to evaluate the process. The company repaired any destruction resulting from this activity. Most of destruction observed were perforated zincs of houses near the blasting zone in which the affected persons were compensated with new zincs, labor cost by the company. This activity was carried out along the project itinerary.



Fig 15: Compensation of affected persons after blasting with zincs to replace perforated ones

3.5.3 Borrow Pit Exploitation

Borrow pits are quarry sites where lateritic soil are exploited for road construction. The geotechnical department generally identifies these sites. They collect samples for various studies according to the CCTP. Those sites retained were transferred to the environmental department for negotiations and exploitations.

The HSE department gives priority during negotiation to areas, which were already exploited so as to reduce environmental degradation. Other concerns included considering those sites with facilities to improve on their drainage pattern at the end of the exploitation, also, sites

which were far from social infrastructures to avoid noise and vibrations from heavy duty machines.

Negotiations were done between the company and the landowner. It was observed that most of the population in the project zone were involved in agricultural activities, and so, every piece of land was valorized making the process difficult. Other difficulties encountered included family set up such as polygamous homes, accessibility to site, distance of borrow pit from site, amount to be compensated in terms of finance given that most families have never had such experience. This led to a longer time to start the exploitation of the site. During exploitation, follow up was done to ensure compliance with the clauses agreed with the land owner. After the exploitation, rehabilitation or the restoration of used sites were done by the company by bringing vegetative soils, planting of trees and sometimes creating a platform to serve for construction.

In essence, the exploitation of borrow pit involves environmental concerns such as environmental degradations during the extraction of earth, felling down of trees, deformation of the natural terrain or landscape, and other social concerns such as social conflict to access site, water stagnation after exploitations etc. Mitigation measures were employed to ensure proper restoration of exploited site such as: proper drainage to avoid water stagnation, bringing vegetative soils to improve on yield, planting of trees to replace those that were fell down, and sometimes creating a plate form to serve for construction.



Fig 16: Borrow pit exploitation

3.5.4 Circulation and Signalization

In order to ensure safety at site in order to improve on circulation, road signs were made by the company for communication purpose for both the company and road users. These were temporal signalization poles with communication messages such as: “STOP”, “ROAD WORKS”, “DEVIATIONS”, “SPEED LIMITS” etc. In addition, flagmen were equally deployed at work zones to enhance circulation through use of physical communication with road users, used of walking talking, and other communication methods. Even though these measures were employed on site, most road users were either ignorant or negligent. Most road users and truck drivers will hardly respect sign poles on speed limit, which were the cause of accident, observed on site.



Fig 17: Road signs to ease circulation



Fig 18: Accident due to over speeding

3.6 IMPLEMENTATION OF ESMP WITHIN THE PROJECT ZONE

3.6.1 Sensitization on HIV, STD's, COVID-19 as a social responsibility

The Cameroonian government has made the fight against HIV a priority. Particular emphasis is placed on awareness campaigns and free HIV testing in different sectors. Migration, mobility, and HIV/AIDS are well documented interlinked phenomena. High rates of HIV infection are generally found along transport routes, in border areas, and in regions experiencing higher seasonal and long-term population mobility. Large infrastructure construction sites offer job opportunities that attract a large number of young people many of whom migrate from poor rural areas of nearby regions.

ESER workers included people from almost all regions of Cameroon and working and leaving in the same milieu with the local populations. Their presence in the project zone influenced the receiving milieu and was a source of pressure on young girls especially of adolescent age. Negative consequences witnessed were cases of unwanted pregnancies, divorce, and other social tensions.

Sensitization was therefore important to create awareness to both the workers and the population on the risk of transmission and propagation of HIV, STDS, and COVID-19.

Firstly, the company started by carrying out campaign within the zone to have an idea about the prevalence of HIV within the project zone and also the company workers. This campaign included the mobilisation of mobile van for sensitisation and voluntary testing on HIV in the project zone. After the camp, sensitization program was established to be carried out once a month. During this monthly activity, only flyers, condoms, talks and demonstration were carried. The company intends to carry out another voluntary testing at the end of the project.



Fig 19: Demonstration of the use of condoms to the local population

Also, in the context of COVID-19 in Cameroon, the local population was sensitised on the virus, its transmission and preventive measures. These measures included; the distribution of facemasks and hand sanitisers to the local population and in the different company's offices. Posters were equally published so as to create awareness and consciousness on the pandemic disease. These shared posters contained the different ways to protect ourselves from the CORONA virus.

- Clean hands often
- Avoid close contacts with people (social distancing)
- Stay home when sick
- Avoid public areas
- Cover coughs and sneezes
- Wear a facemask
- Clean and disinfect



Fig 20: Mitigation measures to fight against COVID-19 infection

3.6.2 Environmental Education

The company in the process to make the local population to have a better understanding on environmental issues such as; waste management, climate change, resource management, hygiene and sanitation, sustainable water resource management, security, signalization etc did environmental education. Environmental education was a need for the pupil and student to foster awareness, knowledge, understanding, attitude, skills and above all participation in the identification of environmental problems around them and to search for possible solutions at their very level with respect to these environmental issues. Environmental education was

carried out by the HSE department in 8 different schools and the following themes were elaborated.

Table 5: Themes on environmental education

Theme	Elaboration of theme
Climate change	Mitigation, Adaptation and resilience
Waste management	Sound practice in waste management
Resource management	Rational use of water and other resources
Safety	Horizontal and vertical signalization
Hygiene and sanitation	Mode of transmission of diseases
Presence of workers in the project zone	Unwanted pregnancies, transmissible diseases and their mode of transmission.



Fig 21: Environmental Education at Government Technical school Tesse

At the end of the elaboration of these themes, some activities were carried out by the students like planting of trees in the school area to help fight against climate change and trash cans were shared in the different schools for waste disposal



Fig 22: Planting of trees by students to help fight against climate change and distributed bins for waste disposal

The table below shows the summary of impacts associated with the various project activities and the mitigation measures in the environmental and social management plan during the implementation phase. Mitigation measures were made to reduce or eliminate the negative impacts of the project. When these measures were not sufficient to reduce the negative impact, recommendation measures were applied.

Table 6: Impacts associated with the various project activities and the mitigation measures during the mitigation phase

Components	Impacts	Mitigative measures
vegetation	Destruction of vegetative soils And landscape during earthworks	<ul style="list-style-type: none"> - minimize tree felling -Sensitization of workers to respect the regulations on forest resources -Restore the vegetation at the end of the work -Restore borrowing pits by reforestation with local species - Compensation for private agricultural land used as dumpsites.
Ground	Risks of erosion and Infiltration	<ul style="list-style-type: none"> - Implementation of anti-erosion measures like planting of creeping grass
Wild life	hunting of animals by workers Destruction of habitats	<ul style="list-style-type: none"> Prohibition of the consumption of hunting meat on the living bases - Prohibition of the purchase and possible sale of products from protected species -Implementation of signage in areas at risk (area of passage of livestock, area frequented by wildlife) -Workers' awareness of compliance with wildlife regulations
Water resource	local change in hydrological regime, water quality and availability	<ul style="list-style-type: none"> Construction of crossing structures so as not to obstruct the flow of surface water -Sensitization of workers to respect the regulations on fishery resources -Recovery of oils, greases and lubricants in containers and their provisions according to environmental standards and requirements -Monitoring the water quality regularly

Component	Impacts	Mitigation measures
Health and security	Risks of sexually transmitted infections (STD's) and transmission water-borne diseases	<ul style="list-style-type: none"> - Sensitization of workers, residents and road users against STD including AIDS -Respect and rigorous control of hygiene conditions on the site -Environmental management of solid and liquid waste -Installation and sanitary equipment and site and base health supervision of workers -Provision of condoms to workers
	User safety and risk of accidents	<ul style="list-style-type: none"> Signalization at the entrance to towns and villages and at critical places -Sensitization of the villagers (by road signs) to traffic dangers -Sensitization of workers, residents and road users -using safety bands
Economy and employment	Creation of employment	<ul style="list-style-type: none"> - Encourage local population during works and subcontracting to local companies (sand extraction, small works). -Respect the minimum age and avoid hazardous work or work requiring considerable effort for women
social	Risk of conflicts	<ul style="list-style-type: none"> - consultation of the populations before the occupation of land
Air and Noise	Air and noise pollution during earthworks	<ul style="list-style-type: none"> Regular watering during earthworks and quarry ramps close to homes - watering of tracks used for transporting materials, work areas and crushing sites - Strict control of the condition of the site machinery -Location and noisy site installations far from homes

RECOMMENDATIONS

In view of the information presented through the results and the analysis that were made in the course of this work, we consider it useful to make some recommendations on the lapses noticed for a better follow-up so as to make the ESMP effective.

- In the course of the project, we met schools and other infrastructures along the project itinerary, which are exposed to accidents due to the increase in traffic (accessibility) by vehicles. These infrastructures are close to the road like the case of Government primary school Tesse PK 5+600 left hand side along the project itinerary and so we recommend that protective structures such as a gate be built to protect these pupils. In that same light, some houses were not destroyed due to lack of finances to pay after expropriation and so we equally recommend adaptive protective structures so as to ensure their safety.
- At the company's base, fire extinguishers were identified at different working departments; garage, restaurants, dormitories and offices, which we think, are not sufficient. We recommend that the number fire extinguishers should be added in these departments to be easily reached in time by any worker in case of any fire outbreak to quench the fire without necessarily searching for long. In addition, these fire extinguishers should be checked upon from time to time and replaced if expired.
- In addition, we noticed in the course of our study that very few workers had appropriate PPE such as facemask, safety glasses, helmet, shoes and jacket. The welders especially at the garage need a facemask and safety glasses because they are exposed to health issues such as respiratory and eye defects. We recommend regular checks on such workers to know their health status.
- Families should be compensated in time and if possible before the implementation phase of the project because some are left homeless due to the long indemnifying process.
- Make frequent sensitization on STDs, HIV / AIDS and other diseases within the project zone so as to keep creating awareness and consciousness from time to time on the presence of these various diseases. This is needed because the presence of income earners in the project

zone influence the receiving milieu and is a source of pressure on young girls especially those of adolescent age.

- It was equally observed that watering of site by the company in habitable zones were not sufficiently done and so we propose that the number of times they water these zones be increased to help the local population fight against air pollution.
- Accidental spillage of bitumen sometimes occurred which could find itself into the gutters and then into water bodies. We propose special care in the transportation and manipulation of storage containers.

GENERAL CONCLUSION

In conclusion, to this study, we can say was enriching and satisfying. The general objective of this study was to evaluate the effectiveness of the mitigation measures that were proposed during the implementation phase by the company ESER in order to reduce or eliminate adverse impacts from activities. In order to achieve this, we had to carry out documentary review in relation to the project, internet research, data collection through regular field works and observations using a guided environmental and social identification form, Interview with senior staff, technicians, and other stakeholders to collect information related to the environmental and social aspect of the project. These different methods helped us to evaluate the mitigation measures proposed by the execution company ESER to reduce or eliminate impacts on the physical, biological and socio-economic aspect of the project during the execution phase. Our results demonstrate that not all the proposed measures were actually implemented during the execution phase. The mitigation measures were effective in some areas and in others lapses. In the areas where these measures were not effective, recommendations were made.

BIBLIOGRAPHY

- African Development Bank (2018). Environmental and social management plan (ESMP) drought resilience and sustainable livelihoods project phase V.
- Commission mondiale sur l'environnement et le développement de l'Organisation des Nations Unies dans rapport Brundtland (1987). Rapport Brundtland.
- Enviro Consulting Sarl (2014). Plan de Gestion Environnementale et Sociale.
- Kurrent technologies LTD (2012). Environmental Impact Assessment study of proposed 100Mw wind energy facility Kadjiado, Kenya.
- Michel, P. (2002). Evolution des systèmes d'étude d'impact sur l'environnement en Afrique centrale : Rôle des associations nationales de professionnels. 138 p.
- MINEPDED (2012). L'Évaluation et le suivi Environnemental des projets.
- OECD/DAC (2002). Glossaire des principaux termes relatifs à l'évaluation et la gestion axée sur les résultats. 38p.
- Pierre, A. ; Claude, E. ; Jean-Pierre, R et Sene, A. (1999). Evaluation des impacts sur l'environnement : Processus, acteurs et pratique, Presse Internationales Polytechnique. 416 p.
- Rainbow Environment Consult (2008). Guide de réalisation et d'évaluation des études d'impact environnemental au Cameroun.
- The Bamako and Basel conventions on toxic and hazardous waste.
- Treaty on the conservation and sustainable management of forest ecosystems in Central Africa.
- United Nations (1992). United Nations Framework Convention on Climate Change. 24p.
- United Nations (1998). Kyoto protocol to the United Nations framework convention on climate change. 20p.
- World Bank (2020). Environmental and social management plan. 50p.
- World Commission on Environment and Development of the United Nations (1987). Brundtland Report.
- MINSANTE/MINHDU (2013). Chapitre 7 : plan de gestion environnementale et sociale. pp 146–167.
- Ntep, J. (2012). L'Evaluation et le suivi environnemental des projets
- MINEPDED (2008). Guide de Réalisation et d'Evaluation des Etudes d'Impact Environnemental au Cameroun. 186p.
- Etude Impact, R. D. (2014). Fabrique camerounaise de parquet 7.
- Manuel de procédure générale des études d'impact et audits environnementaux (2020). Plan de gestion environnementale et sociale.

Lois, Arrêtés et décrets

Arrêté N° 039 / MTPS / IMT du 26 novembre 1984 fixant les mesures générales d'hygiène et de sécurité sur les lieux de travail.

Arrêté N° 00001/MINEPDED du 08 février 2016 fixant les différentes catégories d'opérations dont la réalisation est soumise à une évaluation environnementale stratégique ou à une étude d'impact environnemental et social.

Arrêté N° 039/MTPS/IMT du 26 Novembre 1984 fixant les mesures générales d'hygiène et de sécurité sur les lieux de travail.

Arrêté N° 000831 MINMIDT portant nomenclature des établissements classés.

Convention N°138 of the International Labor Organization (ILO) on the minimum age for admission to employment.

Decree N° 2003/418 / PM of February 25, 2003 fixing the compensation rates.

Decree N° 95/531 / PM of 23 August 1995 sets out the modalities of application of the forest regime.

Decree N° 99/818 / PM of November 9, 1999 setting out the conditions for setting up establishments classified as dangerous, unhealthy and inconvenient.

Décret N° 2013/0171/pm du 14 février 2013 fixant les modalités de réalisation des études d'impact environnemental et social.

Décret N° 98/031 du 09 avril 1998 portant organisation des plans d'urgence et de secours en cas de catastrophe ou de risque majeur.

Décret N° 2005/0577/PM du 23 février 2005 fixant les modalités de réalisation des études d'impact environnemental.

Décret N° 2011/2583/PM du 23 AOUT 2011 portant réglementation des nuisances sonores et olfactives.

Law N° 001 of April 16, 2001 relating to the mining code.

Law N° 64 / LF / 23 of 13 November 1964 on the protection of public health.

Law N° 77/11 of July 13, 1977 relating to compensation and prevention of work accidents and occupational diseases.

Law N° 85/09 of 04 July 1985 relating to expropriation for public utility and to the terms of compensation sets the conditions for expropriation in the event that the State undertakes a realization of general interest.

Law 96/12 of August 5, 1996 on the framework law on environmental management sets the general legal framework for environmental management.

Loi N° 98/015 du 14 juillet 1998 relative aux établissements classés dangereux, insalubres ou incommodes.

Loi N° 98/005 du 14 avril 1998 portant régime de l'eau qui protège les eaux de surfaces et souterraines.

Law N° 92/007 of August 14, 1992 on the labor code.

Law N° 94/01 of January 20, 1994 on the forestry, fauna and fishing regime generally establishes the protection of fauna and flora.

Law N° 96/12 of August 5, 1996 establishing the framework relating to the management of the environment in Cameroon.

Law N° 96/67 of April 8, 1996 on the protection of the national road heritage.

Law N° 98 of July 14, 1998, contributes to the protection of the environment by instituting controls within the road framework relating to parts of automobiles, the defect of which is liable to degrade road infrastructure and the environment.

Law N° 98/005 of April 14, 1998 on the water regime.

Law N° 98/020 of 24 December 1998 governing gas pressure and water vapor pressure devices.

Order N° 000831 MINMIDT on the nomenclature of classified establishments

Order N° 037 / PM of March 19, 2003 establishing a national risk observatory

Order N° 039 / MTPS / LMT of November 26, 1984 setting out general health and safety measures in the workplace.

APPENDIX

APPENDIX 1 : MISE EN POINT PGES

900	ENVIRONNEMENT		
900	<p>Mise au point du PGES</p> <p>Ce prix rémunère au forfait les frais de réalisation par l'entreprise de l'ensemble des études et investigations complémentaires à caractère environnemental et social avant, pendant et après les travaux :</p> <ul style="list-style-type: none"> -La sensibilisation et l'information des populations et des usagers de la route dans tous les arrondissements ; -L'organisation des ateliers de formation des formateurs ; -L'organisation des causeries éducatives ; -La production des supports de communication ; -La mobilisation des experts et la logistique ; -La production des rapports d'activités ; -La construction de trois (03) forages d'eau profonds à motricité humaine ; -L'Elaboration d'un Plan de Gestion Environnemental (PGE) du chantier incluant un programme de mise en œuvre des mesures environnementales cadrant avec le planning prévisionnel des travaux, ainsi que les procédures d'Hygiène-Sécurité-Environnement (HSE) complétant le PGES, notamment pour le recrutement de la main d'œuvre (équipement de protection individuelle, formation HSE, formation d'un groupe de secouriste, aménagement des locaux sociaux, etc...), la gestion des divers type de déchets, le traitement des pollutions accidentelles, le dépotage et ravitaillement en carburant, la gestion de l'eau, l'entretien des engins, la maîtrise des émissions sonores et atmosphériques, le choix, l'exploitation et la réhabilitation des sites destinés à l'usage de l'entreprise, etc... -Etablissement d'un système de Management de l'Environnement (SME) de l'Entreprise en harmonie avec son Plan d'Assurance Qualité ; -Réalisation d'enquêtes préalables au choix des aires destinées à l'usage de l'entreprise : choix des sites d'implantation de la base vie, du parc matériel, des centrales de concassage, des zones d'emprunt et de dépôt provisoire et définitif, du dépotoir des déchets, etc... -Mise en place des panneaux (métallique ou bois) d'indication et d'information des usagers et de la population riveraine sur le déroulement du chantier (au moins un panneau par localité située sur l'axe du projet ; -Le recrutement d'un Responsable environnemental de chantier ; -la rédaction d'un règlement intérieur ; -La mise en place et le maintien des déviations ; -La gestion des déchets de chantier ; -La prévention des accidents et protection de la santé des employés et des populations riveraines ; -L'aménagement des accès riverains ; -La sensibilisation des populations contre les IST et VIH SIDA ; 		prov

	<p>-La sensibilisation des populations à l'utilisation et à la nécessité de la bonne utilisation des différents équipements de la route tels que les réceptacles à bacs à ordures, les signalisations verticales et horizontales, etc...</p> <p>-L'assistance à personnes déplacées.</p> <p>Toutes sujétions.</p> <p>La provision à : Cent millions francs CFA</p>	<p>Prv</p>	<p>100 000 000</p>
--	---	-------------------	---------------------------

APPENDIX 2 : ESTIMATION DU COUTE DU PGES

OBJECTIF	ACTION PERTINANTES	CALANDRIER DE MISE EN OEUVRE	INDICATION DU SUIVIR	COUTE DE MISE EN ŒUVRE (FCFA)
Mise au point du PGES	<p>MISE EN ŒUVRE DU PROGRAMME DE GESTION ENVIRONNEMENTALE ET SOCIAL</p> <ul style="list-style-type: none"> – Recrutement d’un Responsable environnemental de chantier ; – Approbation du PGES et PPES – La rédaction d’un règlement intérieur ; – La mise en place et maintien des déviations ; – La gestion des déchets de chantier ; – La prévention des accidents et protection de la santé des employés et des populations riveraines ; – L’aménagement des accès riverains ; – La sensibilisation des populations contre IST et VIH SIDA – La sensibilisation des populations à l’utilisation et à la nécessité de la bonne utilisation de différent équipement de la route tel que les réceptacles a bacs à ordures, les signalisation verticales et horizontales ; – Construction de trois (03) forages d’eau profonds à motricité humaine ; – Sensibilisation et information des populations et des usagers de la route dans tous les arrondissements ; – La production des rapports d’activités – Mise en place des panneaux des signalisations 	Approbation du PGES et PPES	<p>Existence d’un PGES et PPES approuvé</p> <ul style="list-style-type: none"> • Existence d’un règlement intérieur affiché au chantier • Existence d’un organigramme de l’Entreprise où figure un environnementaliste ; • Existence d’un plan de prévention et de lutte contre les IST/SIDA • Existence d’un plan d’hygiène et de sécurité pour le personnel et les riverains • Existence d’un plan de gestion des emprunts, dépôts et carrières • Existence d’un plan de remise en état des sites 	100.000.000

<p>Communication</p>	<p>Transport –Visit-document</p> <ul style="list-style-type: none"> • Transport sur le site • Visites et réunions de chantier • Documentation approuvée 	<p>en cour et continue jusqu'a en fin du chantier</p>		<p>10.000.000fca</p>
<p>Abbatage d'arbres</p>	<ul style="list-style-type: none"> - La coupe de tout arbre de diamètre supérieur à cinquante (>50) cm <p>Le découpage des troncs, l'évacuation de tous les produits issus de la coupe en un lieu agréé par la Maitre d'œuvre.</p> <p>Toutes indemnisations éventuelles de riverains</p>	<p>déjà en cour à partir de mois de mai 2018</p>	<p>15 Arbres abattu et découpé, stocké ou mise à la disposition de la population locale</p>	<p>1.500.000F.CFA</p>
<p>Lutter contre les effets du réchauffement climatique</p>	<p>Plantation d'arbres sélectionnés</p> <ul style="list-style-type: none"> - La mise au point du plan de plantation des sites ; - La fourniture à pied d'œuvre des sujets à planter ; - L'implantation préalable de chaque sujet ; - La plantation et la mise en place éventuelle d'un tuteur ; - L'arrosage et l'entretien pendant un délai de garantie de 6 mois - Toutes sujétions liées aux prescriptions environnementales 		<p>29 arbres plantés</p>	<p>2.900.000F.CFA</p>

Stabiliser les talus	<p>Engazonnement des talus</p> <ul style="list-style-type: none"> • La préparation du terrain pour recevoir les semis ou la plantation ; • L'extraction éventuelle du gazon en plaques de 10 cm d'épaisseur, la fourniture à pied d'œuvre, sa mise en place ; • La fourniture éventuelle et la mise en œuvre des semences ; • L'arrosage et l'entretien jusqu'à la reprise vivace des plants ; • Toutes sujétions liées au respect des prescriptions environnementales ; 		103862,50m ² engazonnée	207 725 000F.CFA
-----------------------------	--	--	---------------------------------------	------------------

APPENDIX 3 : FICHE D'AGREEMENT CARRIER OU EMPRUNT

FICHE D'AGREEMENT CARRIER OU EMPRUNT						
Entreprise						
Localisation du site						
Projet	N° Profile	Village	Pk	Côté		Distance de l'ouvrage
Description du site avant exploitation						
SITE	Distance observée	Normes	Contrainte particulière	Resp. Env Entreprise		Maître d'œuvre
	Distance de la route en construction			Visa		Visa
	Distance du cours d'eau					
	Distance des habitations					
	Pente du terrain naturel					
Couvert végétal						
TYPE	Description	Espèces à préserver	Quantité	Resp. Env Entreprise		Maître d'œuvre
Culture				Visa		Visa
Végétation naturelle						
Vieille jachère						
Autres						
Prélèvement des matériaux				Resp. Env Entreprise		Maître d'œuvre
Nature des matériaux à prélever						
Superficie (m ²)						
Puissance (m3)						
ACCORD DU PROPRIETAIRE		OUI		NON		
POUR L'ENTREPRISE			POUR LA MDC			

APPENDIX 4 : FICHE DES PARAMETRES ENVIRONNEMENT AUX SITE DE DEPOT

FICHE DES PARAMETRES ENVIRONNEMENTAUX DU SITE DE DEPOT						
Entreprise						
Localisation du site de dépôt						
	N° Profile	Village/Quartier	Pk	Côté		Distance de l'ouvrage
Description du site avant exploitation						
SITE	Distance observée	Normes	Contrainte particulière	Resp. Env Entreprise		Maître d'œuvre
Distance de la route en construction				Visa		Visa
Distance du cours d'eau						
Distance des habitations						
Pente du terrain naturel						
Couvert végétal						
TYPE	Description	Espèces à préserver	Quantité	Resp. Env Entreprise		Maître d'œuvre
Culture				Visa		Visa
Végétation naturelle						
Vieille jachèr						
Autres						
Prélèvement des matériaux				Resp. Env Entreprise		Maître d'œuvre
Nature des matériaux à déposer				Visa		Visa
Superficie (m²)						
Puissance (m³)						
ACCORD DU PROPRIETAIRE		OUI	NON			
POUR L'ENTREPRISE				POUR LA MDC		

APPENDIX 5 : FICHE DES PARAMETRES ENVIRONNEMENTAUX DU SITE DE DEPOT

FICHE DES PARAMETRES ENVIRONNEMENTAUX DU SITE DE DEPOT					
Entreprise					
Localisation du site de dépôt					
	N° Profile	Village/Quartier	Pk	Côté	Distance de l'ouvrage
Description du site avant exploitation					
SITE	Distance observée	Normes	Contrainte particulière	Resp. Env Entreprise	Maître d'œuvre
Distance de la route en construction				Visa	Visa
Distance du cours d'eau					
Distance des habitations					
Pente du terrain naturel					
Couvert végétal					
TYPE	Description	Espèces à préserver	Quantité	Resp. Env Entreprise	Maître d'œuvre
Culture				Visa	Visa
Végétation naturelle					
Vieille jachère					
Autres					
Prélèvement des matériaux				Resp. Env Entreprise	Maître d'œuvre
Nature des matériaux à déposer				Visa	Visa
Superficie (m²)					
Puissance (m³)					
ACCORD DU PROPRIETAIRE		OUI	NON		
POUR L'ENTREPRISE			POUR LA MDC		

APPENDIX 6 : FICHE DE CARRIERE

ENTREPRISE : ESER

Localisation de la zone d'activité

Tronçon	Longueur	PK	Activité

Paramètre de la carrière (en phase de travaux)

Agrément carrière Oui

Non

Configuration	Quantité ou volume	Observation
Surface totale		
Volume des terres végétales		
Volume des terres exploitables		
Distance par rapport à la route		
Distance par rapport à un cours d'eau		
Nombre d'arbre coupés		

Paramètre de la carrière (après exploitation)

Configuration	Quantité ou volume	Observation
Nombre de plaintes enregistrées		
Surface aménagée (remise en état des lieux)		
Nombre d'arbres replantés		

Remise en état

Consultation des propriétaires ou des riverains	Type de remise en état	Observations
	<input type="checkbox"/> Stade de football	
	<input type="checkbox"/> Site de construction d'habitation	
	<input type="checkbox"/> Site de plantation future	
	<input type="checkbox"/> Réglages de matériaux et restitution de la terre végétale	
	<input type="checkbox"/> Autres investissements	

APPENDIX 7 : PRIX 900 DU PGES A EXECUTE PAR BEE RSE

Prix 900 du PGES à exécute par BEE RSE

Num	Désignation	Activités	Prix
900.1	Santé et sécurité du personnel		
	Mobilisation d'un infirmier, convention médicale avec l'hôpital, protection du personnel	Consultations, administration de soins, sensibilisation, provision de préservatif, etc	8 500 000
900.2	Gestion des déchets spéciaux		
	Convention avec BOCOM pour le traitement de déchets spéciaux	Huiles usées, filtres, roués usées, et autres déchets biodégradables	2 550 000
900.3	Production des supports		
	documents	PGES, PPES,	4 250 000
900.4	Recrutement d'un HSE		
	Mobilisation HSE	Mise en œuvre du PGES, PPES,	9 775 000

900.5	Campagne de sensibilisation contre IST et VIH SIDA		
	Villages/quarters	Themes	Cost
	1. Pete (Tobe) 2. Kamgo 3. Kayo 4. Tse 5. Touoba 6. Tesse 7. Kam-Tesse	<p><u>Unité Mobile</u></p> <ul style="list-style-type: none"> - Equipe mobile de dépistage du VIH (matériel) ; - Sensibilisation et distribution des dépliants ; - Multiplication des dépliants ; - Distribution des préservatifs masculins ; - Distribution des préservatifs féminins ; <p><u>Formation</u></p> <ul style="list-style-type: none"> - Préparation des modules de formation ; 	

8. Kouekong	<ul style="list-style-type: none"> - Perdiems formateurs ; - Transport formateurs ; - Eau pour 30 pairs éducateurs ; - Matériel didactiques ; - Location vidéo projecteur ; <p><u>Sensibilisation</u></p> <ul style="list-style-type: none"> - Passage des messages à la radio ; - Fabrication Banderole ; - Frais de pose banderole ; - DG et imprésario ; 	23 800 000
-------------	---	-------------------

	<p><u>Supervision et suivi mensuelle des activités par GTR/OU</u></p> <ul style="list-style-type: none"> - Suivi mensuel des personnes dépistées positives ; - Crédit de communication ; - Carburante ; rédaction du rapport, reprographie ; rafraîchissement, autorité 	
--	---	--

900.6	Education environnementale	
<ol style="list-style-type: none"> 1. Ecole Public de Kamgo 2. Ecole catholique de Kamgo 3. Ecole public de Kayo 4. Ecole Catholique de Tse 5. Ecole Catholique de Touoba 6. Ecole Public de Tesse 7. Lycée Technique de Tesse 8. CEBEC Tesse 	<ul style="list-style-type: none"> - Education environnemental - Lutte contre changement climatique (adaptation et mitigation) - Hygiène, gestion de déchets ; - L'accident de circulation ; - Protection de l'environnement. 	6 800 000

APPENDIX 8: CONSTRUCTION DE TROIS (03) FORAGES D'EAU A MOTRICITE HUMAIN

PRIX 900 du PGES à sous traité au COMPLEXE INDUSTRIEL			
900.7	Construction de trois (03) forages d'eau à motricité humain		
	<ul style="list-style-type: none"> - 02 forages a Koung-KHI - 01 forage a MIFI 	<ul style="list-style-type: none"> - Etude géophysique et implantation du forage ; - Préparation, amenée et repli du matériel ; - forage des altérites ; - pose et arrachage du tubage provisoire ; - forage du socle au MFT ; - fourniture et pose de PVC plein ; - Fourniture et mise en place massif filtrant en gravier calibré ; - Mise en place d'une tête de forage ; - Nettoyage et développement du forage à l'air lift ; - Essai de pompage par pilier ; - Réalisation de la margelle et d'un socle pour pose de la pompe ; - Equipment ; - analyses et de traitement des eaux ; - Comité de gestion ; - Autorité 	29 325 000
TOTAL		29 325 000	

Formation de 2 jours de type « appui au développement local » des membres de chaque comité de gestion sur la base du «*learning-by-doing*», afin de les faire :

- maîtriser le fonctionnement de la structure de gestion (statuts, règlement intérieur et relations avec les autres acteurs) ;
- intégrer et capitaliser la notion de participation communautaire pendant les travaux ;
- concevoir et réaliser les aménagements autour d'un point d'eau et entretenir ses abords ;

- maîtriser les opérations quotidiennes liées au fonctionnement et à l'entretien de la pompe ;
- savoir tenir un cahier de recettes et dépenses et rendre compte du montant de l'épargne ;
- comprendre le contrat de maintenance et connaître les réparations principales.

BEE RSE	55 675 000 FCFA
COMPLEXE INDUSTRIE	29 325 000 FCFA
TOTAL	85 000 000 FCFA

APPENDIX 9: ATTESTATION DE FIN DE STAGE



ESER CONTRACTING

671 AVENUE ROSA PARKS 6.012
EN FACE DE L'AMBASSADE DES ETATS UNIS D'AMÉRIQUE - BASTOS
B.P:35411 YAOUNDÉ - CAMEROUN
Tel: (+237)222 20 71 27 Fax: (+237)222 20 71 28
Email: Cameroon@eser.com

AND INDUSTRY CAMEROON INC. CO.

ATTESTATION DE FIN DE STAGE

Je soussigné, Monsieur **François BIKES**, Directeur du projet ESER Contracting & Industry Bandjoun.

Atteste par le présente avoir accompagné les travaux de recherché de Mlle **KWALI DENISE**, étudiante de l'Ecole Nationale Supérieure des Travaux Publics (ENSTP) Yaoundé, pour le compte de son Mémoire de fin d'étude sur le thème: «**EVALUATION OF ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN: THE CASE OF THE ROAD CONSTRUCTION PROJECT TO ACCESS THE KOUKONG STADIUM LOT D-1 IN PREPARATION OF THE 2021 AFRICA CUP OF NATIONS IN CAMEROON**» pendant une période de six mois, de Décembre 2020 à Mai 2021.

Par conséquent, cette présente attestation est fait pour server et valoir ce que de droit.

05 JUIN 2021

Bandjoun, le



Le Directeur

Registre de commerce : RC/YAO/2016/B/964
Numéro Contribuable : M091100038085T