



AFRICAN DEVELOPMENT BANK GROUP

PROJECT : TRANSPORT SECTOR SUPPORT PROGRAMME PHASE 2

COUNTRY : REPUBLIC OF CAMEROON

SUMMARY ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

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Programme Name : Transport Sector Support Programme Phase 2 SAP Code: P-CM-DB0-015
Country : Cameroon
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1. INTRODUCTION

This document is a summary of the Environmental and Social Impact Assessment (ESIA) of the Transport Sector Support Programme Phase 2 which involves the execution of works on the Yaounde-Bafoussam-Bamenda road. The impact assessment of the project was conducted in 2012. This assessment seeks to harmonize and update the previous one conducted in 2012. According to national regulations, the Yaounde-Bafoussam-Babadjou road section rehabilitation project is one of the activities that require the conduct of a full environmental and social impact assessment. This project has been classified under Environmental Category 1 in accordance with the African Development Bank's Integrated Safeguards System (ISS) of July 2014. This summary has been prepared in accordance with AfDB's environmental and social impact assessment guidelines and procedures for Category 1 projects.

2. POLICY, LEGAL, ADMINISTRATIVE AND INSTITUTIONAL FRAMEWORK

2.1 Legal Framework in Cameroon

The national legal framework governing the project's environmental component comprises the following laws and regulations: (i) Framework Law No. 96/12 of 5 August 1996 governing environmental management; (ii) Decree No. 2013/171/PM of 14 February 2013 defining the conditions for conducting environmental and social impact assessments; (iii) Order No. 70/MINEP of 22 April 2005 defining the various categories of operations subject to a full impact assessment and a summary impact assessment; (iv) Decree No. 2011/2582/PM of 23 August 2011 defining the conditions for protecting the atmosphere; (v) Decree No. 2011/2583/PM of 23 August 2011 regulating sound and odour nuisances; (vi) Decree No. 2011/2584/PM of 23 August 2011 defining the conditions for soil and subsoil protection; (vii) Decree No. 2011/2585/PM of 23 August 2011 establishing the list of harmful or dangerous substances and the system of discharging them into inland waters; (viii) Order No. 1/MINEP of 3 April 2013 laying down the organization and functioning of Divisional Environmental and Social Management Plan (ESMP) Implementation Monitoring Committees; (ix) Law No. 94/1 of 20 January 1994 laying down forestry, wildlife and fisheries regulations; (x) Decree No. 95/531/PM of 23 August 1995 laying down the conditions for implementing forestry regulations; (xi) the January 1998 standards governing interventions in forest areas; (xii) Law No. 98/5 of 14 April 1998 laying down regulations governing water resources; Order No. 39/MTPS/IMT of 26 November 1984 laying down general measures of occupational health and safety at workplaces; (xiv) Law No. 91/8 of 30 July 1991 on the protection of cultural and natural heritage given the importance attached to tourism and tourist sites, and the archaeological heritage that may be discovered during works.

From the environmental standpoint, the road sector is governed by Circular No. 908/MINTP/DR on guidelines for mainstreaming environmental impacts into road maintenance; Law No. 96/67 of 8 April 1996 on the protection of national roads which defines the road right-of-way as set forth under the laws governing State-owned lands, as well as Decree No. 2005/330 of 6 September 2005 organizing the Ministry of Public Works.

With respect to the affected property, the national legal framework governing compensation comprises Law No.85/9 of 4 July 1985 on expropriation for public purpose and conditions for compensation; Order No. 832/4.15.1/MINUH/D 000 defining the conditions for implementing Law No. 85/9 of 4 July 1985 concerning finished and unfinished buildings; and Decree No. 2003/418/PM of 25 February 2003 setting compensation rates payable to owners of crops and cultivated trees destroyed for public purposes.

2.2 International Agreements

Cameroon is signatory to most international and regional agreements on environmental protection, prominent among which are: (i) the 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage; (ii) the CITES Convention of 1973; the 1992 Rio United Nations Convention on Biological Diversity (CBD); (iii) the United Nations Framework Convention on Climate Change (UNFCCC); (iv) the Rotterdam Convention on Prior Informed Consent (PIC) and the Stockholm Convention on Persistent Organic Pollutants (POPs); (v) the International Tropical Timber Agreement of Geneva; (vi) the 2003 African Convention on the Conservation of Nature and Natural Resources signed in Maputo, the purpose of which is to ensure sustainable development of African economies; and (vii) Cooperation and Consultative Agreement among Central African States on the Conservation of Wildlife and the Creation of a Special Fund for the Conservation of Wildlife.

2.3 Institutional Framework in Cameroon

Environmental management in Cameroon is the responsibility of the Ministry of Environment, Nature Protection and Sustainable Development (MINEPDED). Since this project covers several sectors, the Inter-Ministerial Committee for Validation of this ESIA Report and the Identification and Assessment Committee (CCE) responsible for assessing the affected property are involved. The following Ministries will intervene in both bodies at various levels: the Ministry of Forestry and Wildlife (MINFOF); the Ministry of Public Works (MINTP); the Ministry of Energy and Water Resources (MINEE); the Ministry of Industry, Mines and Technological Development (MINIMIDT); the Ministry of Agriculture and Rural Development (MINADER); the Ministry of Livestock, Fisheries and Animal Industries (MINEPIA); the Ministry of Territorial Administration and Decentralization (MINATD); and the Ministry of State Property, Surveys and Land Tenure (MINDCAF).

Apart from these Ministries, project activities will involve local communities and councils, local village communities, local support organizations (LSOs) and the most active environmental NGOs in the project area, such as WWF, WCS, CBP, GIZ and Nature Cameroon.

2.4 African Development Bank (AfDB)

The Integrated Safeguards System (ISS) comprises the following five operational safeguards:

- Operational Safeguard 1 : Environmental and social assessment;
- Operational Safeguard 2 : Involuntary resettlement - land acquisition, population displacement and compensation
- Operational Safeguard 3 : Biodiversity and ecosystem services;
- Operational Safeguard 4 : Pollution prevention and control, greenhouse gases, hazardous materials and resource efficiency;
- Operational Safeguard 5 : Labour conditions, health and safety.

The other relevant policies and guidelines are applicable once they are triggered within the SSI framework, in particular:

- The Bank’s Gender Policy (2001);
- The Framework for Enhanced Engagement with Civil Society Organizations (2012);
- The Disclosure and Access to Information Policy (2012);
- The Handbook on Stakeholder Consultation and Participation in AfDB Operations (2001);
- The Bank’s Policy on Population and Strategies for Implementation (2002);
- The Environmental and Social Assessment Procedures for the Bank’s Public Sector Operations (2015).

3. PROJECT RATIONALE AND DESCRIPTION

3.1 *Rationale*

The Yaounde-Bafoussam-Bamenda (RN1 - RN4 - RN6) road, which was commissioned in the 1980s, is in an advanced state of degradation, except for a few recently paved sections between Yaounde and Ebebda, Tonga and Banganté and Bafoussam-Mbouda-Babadjou. The road accounts for about 11% of accidents and 16% of deaths recorded on Cameroonian roads. By time blocks, 35% of accidents occur between 6.00 p.m. and 6.00 a.m. Infrastructural deficiencies (narrowness of the carriageway and inadequate road signs) are among the most common causes of accidents. The traffic count carried out by MINTP in 2011 shows that the annual average daily traffic (in both directions) on the road varies from 3 000 to more than 7 000 vehicles, and heavy duty vehicle traffic between 12% and 24%, depending on the homogeneous section. The project has a multidimensional importance to Cameroon.

3.2 *Project Objectives and Components*

The project’s overall goal is to contribute to extending and modernizing Cameroon’s road network in order to support economic diversification. The specific project objective is to improve traffic fluidity, road safety and living conditions in the project area.

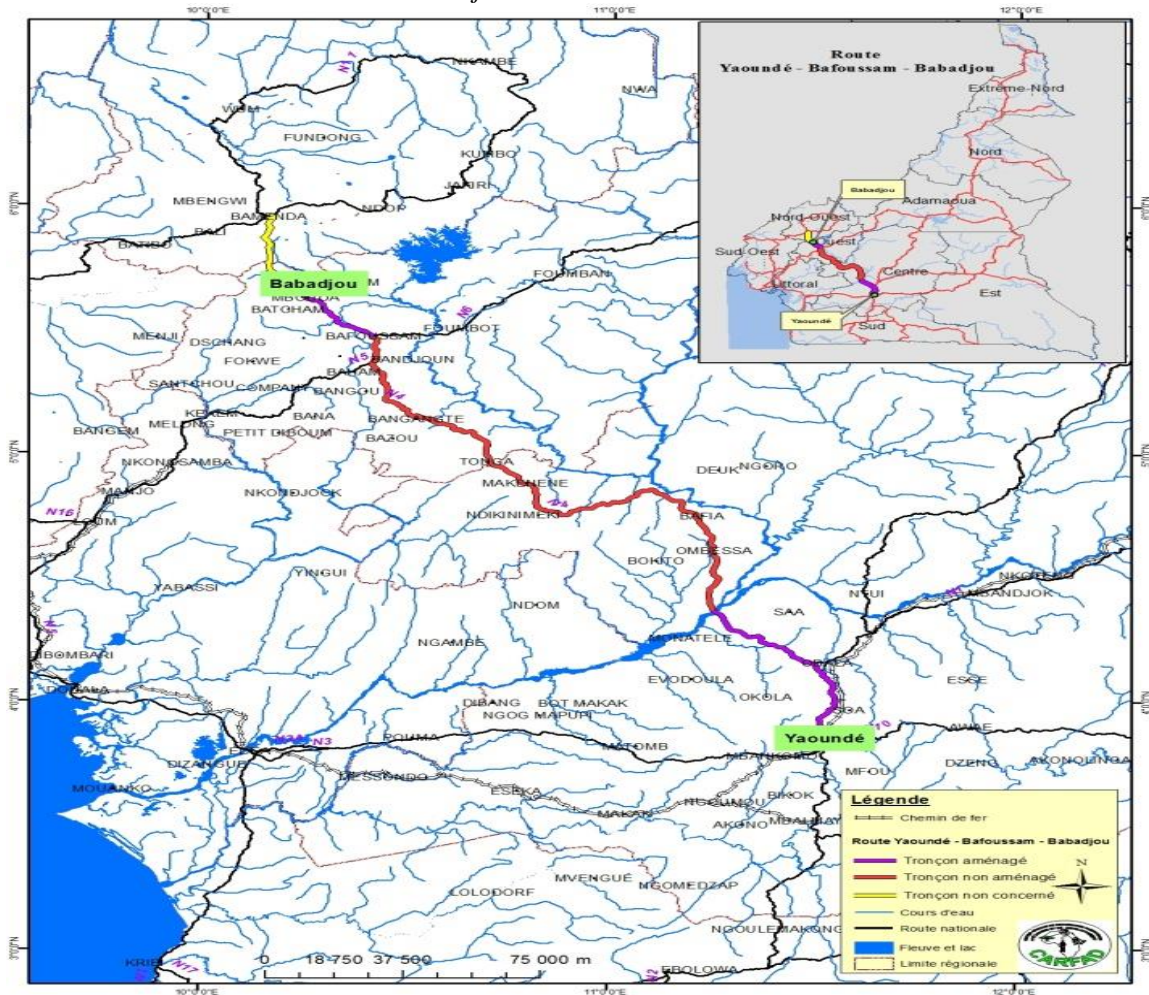
Table 1
Project Components

Component Name	Description
ROAD WORKS	1.1. Rehabilitation of the degraded Yaounde-Bafoussam interurban section (228 kilometres); 1.2. Upgrading of the Maroua-Bogo-Maga-Pouss road (93 kilometres); 1.3. Upgrading of the Grand-Zambi-Kribi road (55 kilometres); 1.4. Upgrading of 35 kilometres of urban roads in the major towns crossed; 1.5. Construction of infrastructure and weighing and load control devices between Yaounde and Babadjou; 1.6. Routine and periodic maintenance of the Yaounde-Bafoussam-Babadjou road section over a ten-year period using the Road Maintenance Management Service by Level (GENIS) method; 1.7. Sensitization on environmental protection and road safety; 1.8. Works control and supervision.
RELATED WORKS	1.1. Rehabilitation and/or construction of basic socio-economic infrastructure; 1.2. Support for specific activities of women's associations (CPF, multi-purpose platforms, etc.); 1.3. Rehabilitation of rural markets along the road; 1.4. Control and supervision of related works.
ROAD SECTOR STUDIES AND INSTITUTIONAL SUPPORT	1.1. Technical assistance to build the institutional capacity of the Ministry of Public Works (MINTP) in road project monitoring and coordination; 1.2. Transport sector strategy development; 1.3. Feasibility study on the establishment of a road agency; 1.4. Final design of the bypass of Bafoussam; 1.5. Final design for widening the northern dual carriageway into Yaounde and the north-south dual carriageway into Bafoussam.
PROJECT MANAGEMENT	1.1 Support for the Project Monitoring and Coordination Unit; 1.2 Socio-economic and environmental impact monitoring and evaluation; 1.3 Project accounting and financial audit. 1.4 Project technical audit.

Source: NCP (September, 2015)

11.2 The project cost, which is estimated at UA 348.93 million, or CFAF 286.495 billion, will be co-financed by the Bank, the World Bank and the State of Cameroon. World Bank financing, which is parallel to the Bank's financing, will cover the 48-kilometre long Babadjou-Bamenda section. Figure 1 shows the location of the Yaounde-Bafoussam-Babadjou section. As indicated above, the present ESIA summary concerns this section and its related works. Another ESIA summary is being prepared for the Grand-Zambi-Kribi section.

Figure 1
Project Location



Source: ESIA report 2013

3.3 Present State of the Road

Overall, the Yaounde-Bafoussam-Babadjou road section presents various forms of degradation and deficiencies, namely: (i) road dotted with potholes; (ii) depression and spalling of the carriageway; (iii) depression of backfills; (iv) gullies and cave-ins; (v) scouring of backfills, etc. The deficiencies particularly concern the absence of a bituminous concrete surface course between Bangangté and Bandjoun (as the existing course has a surface dressing). Furthermore, road signs are inadequate, and guardrails on several bridges are damaged.

3.4 Key Inputs Required

Water: Water will be one of the products consumed in large quantities during project implementation. Large volumes of water will be needed, particularly to mix concrete, obtain the optimum compaction of the different layers of materials that make up the road formation, and various cleanups in project sites. The criteria to guide the selection of rivers from where water will be collected for use on the project site include the seasonality of river flow and quality of river water. The seasonality of river flow will be discussed in the next chapter, which describes the initial state of the environment. It is understood that the collection of water from a seasonal river may jeopardize its uses.

Fuel: The operation of construction machines and vehicles is heavily dependent on the supply of fuel and lubricants (oils and grease). The accidental discharge of these products during their handling may pollute various environments. The same is true for waste resulting from their use (drain oil).

Rocks and Laterite: The aggregates needed for the works may be collected from the rocks in Makénéne quarry. These rocks were used for the construction of the road, and more recently for the rehabilitation of the Yaounde-Ebebda and Bafoussam-Babadjou road sections. Borrow material sites may be selected based on the quantities to be collected and the results of the study on the availability of borrow materials carried out recently in the project area by the National Civil Engineering Laboratory (LABOGNIE).

Labour Force: Construction site requirements in terms of the number of people to be mobilized have not yet been estimated. However, it should be noted that labour-intensive (HIMO) works will be prioritized since it is possible to replace machines with human labour which limits the impact of works on the environment. Most manual tasks, such as clearing and cleaning out of structures could be sub-contracted to local population.

4. DESCRIPTION OF THE PROJECT ENVIRONMENT

The study area comprises a direct impact area which is the geographical area of the different project activities (construction activities and project input areas) and an indirect impact area made up of the geographical space extending to localities bordering those located along the site.

4.1 Physical Environment

Climate

The rainfall pattern and temperatures distinguish several climate patterns:

- The area between Yaounde and the vicinity of Ebebda in Lékié Division has a hot and humid sub-equatorial climate. Annual average rainfall varies between 1,500 millimetres and 1,600 millimetres. The average temperature ranges from 22.9°C to 25°C;
- The climate of the area between Ebebda Bridge over River Sanaga and River Nde is characterized by a decline in annual rainfall to about 1 400 millimetres. The minimum temperature ranges from 2.5°C to 3°C, while the maximum temperature is 30°C.
- The area between Tonga and Babadjou, which has a Cameroonian-type high-altitude climate, has high annual rainfall ranging from 1,250 millimetres to 2,000 millimetres. January to March are the driest months; temperatures range from 19°C to 29°C.

Air Quality

Traffic on the Yaounde-Bafoussam-Babadjou road section is one of the heaviest in Cameroon. People and goods are transported in both directions day and night. Vehicles and other sources of air pollution in the urban centres crossed release large quantities of pollutants into the atmosphere. Though the measurement of atmospheric constituents has not been done, it is possible to identify them. These include: (i) carbon dioxide from fuel combustion; (ii) methane emitted from landfills; (iii) carbon monoxide from the incomplete combustion of hydrocarbons and the burning of wet refuse; (iv) lead and heavy metals produced during peak hours (heavy traffic); and (v) chlorofluorocarbons (CFCs) which deplete the ozone layer, emitted by refrigerators, freezers and air conditioners.

Relief

The project site has a fairly diversified relief. The relief of the area near Yaounde is characterized by billowing hills separated by a maze of small valleys which sometimes broaden into swampy basins. The roughly circular hills rise to almost 750 metres. The area around River Sanaga and its tributary, River Mbam, has a peneplain comprising four terraced levels separated by sharp escarpments. The western part of Cameroon is a vast rugged plateau covered by mountains with granitic or volcanic peaks. The altitude of the plateau ranges from 800 metres in Tonga to 1,400 metres in Bandjoun.

Hydrology

The hydrography of the project site consists of several rivers that take their rise in the Mbam watershed and criss-cross the road. River Mbam itself flows into River Sanaga a little upstream of Ebebda Bridge. Rivers Sanaga, Ndé, Météché, Makénéne and Mbouma have the highest flow rates. These are permanent rivers, which could be used to meet the water needs of the Yaounde-Bafoussam-Babadjou road upgrading project. These rivers are used for various purposes in the areas they cross. There is a scarcity of drinking water in localities situated along the project site. Rivers are the only resource of water, which is even used as drinking water without adequate treatment. The populations are exposed to faecal peril and other diseases related to the consumption of unsafe water. In fact, the people interviewed reported a high prevalence of these diseases in the communities located along the project site. Measures should therefore be taken during works execution to avoid further impairing the quality of the rivers crossed by the project.

Topography and Pedology

The project site has a fairly diversified relief. The relief of the area near Yaounde is characterized by billowing hills separated by a maze of small valleys, which sometimes broaden into swampy basins. The roughly circular hills rise to almost 750 metres.

The area around River Sanaga and its tributary, River Mbam, has a peneplain comprising four terraced levels separated by sharp escarpments, namely: (i) the higher level (540 metres to 640 metres in altitude); (ii) the intermediate level (480 metres to 540 metres in altitude); (iii) the low level (440 metres to 480 metres in altitude); and (iv) the lower Sanaga-Mbam valley (380 metres to 440 metres in altitude).

The western highlands, whose coordinates are 4°55-5°57 N and 9°50-10°55 E, lie on granitic- or basaltic-type parent rocks. The average altitude is 1,300 metres. They are separated from the surrounding areas by cliffs of about 700 metres in height. The western part of Cameroon is a vast rugged plateau covered by mountains with granitic or volcanic peaks. The altitude of the plateau ranges from 800 metres in Tonga to 1,400 metres in Bandjoun.

4.2 Biological Environment

Flora

The project extends to phytogeographic zones with different features. The original vegetation of the area between Yaounde and Obala is the dense semi-deciduous rainforest. There are two facies depending on the level of urbanization of the area, namely:

- (i) the degraded semi-deciduous forest in less urbanized areas with sites that are relatively intact, alternating with degradation facies with some original forest trees and anthropogenic elements;
- (ii) the semi-deciduous forest at the ultimate stage of degradation in highly urbanized areas. This is the case where all trace of natural vegetation has disappeared, making room for some vestige trees.

The area between Obala and the bridge over River Sanaga at Ebebda is dominated by fruit trees and cocoa plantations. The vegetation at the confluence of the Sanaga and Mbam is characteristic of the forest-savanna contact area. The herbaceous layer mainly consists of *Hyparrhenia diplandra* and other species of the same genus. The most common tree species are *iroko*, *ayos* and *fraké*.

Due to the strong pressure exerted by people on wood resources for domestic and building purposes, the project should consider implementing mitigation measures.

Community Forests

There is no community forest in the direct project impact area.

Wildlife

The project area has a rich and diversified aquatic wildlife. It includes species found in rivers Sanaga and Mbam and other rivers that make up the hydrography of the site. However, it should be noted that sand extraction activities have reduced the fish population in the Sanaga and some of its tributaries. The wildlife species include:

- fish species such as sardine (*Sardinellamaderensis*), alose (*Ethmalosadorsalis*), lesser African threadfin (*Galeoidesdecadactylus*), bigeye grunt (*Brachydeuteurus auritus*), African catfish (*Clarias gariepinus*), Nile mouthbrooder (*Oreochromisniloticus*), African cubera snapper (*Lutjanus agennes*), catfish (*Tashisurusheudeloti*), tilefish (*Otolithusbrachygnatus*), sardinella (*Illichiaafricana*), spangled emperor (*Corvinanigrataspp*), small Nile perch (*Galeoides polydactilus*), Nile perch (*Polynemusquadrifilus*), banded neolebias (*Neolebias spp*), (*Hepsetusodoespp*), *Hemidiromisfasciatus*, *Polimyruskingsleyae* and *Mormiropusspp*;

- crustacea: *Euparopeus africanus*, *Callinectes latimatus*, *Parapenaepsis atlantica* and *Palaemon hastatus*;
- molluscan shellfish: *Crassostrea gasar*, *Crassostrea rufo*, *Sphonarium ouret*, *Purpura yetus* and *Purpura collifera*.

Aloses are among the most important fish species from the economic viewpoint because they are smoked and sold in almost all markets in the country and known by the local name “*Mbounga*” or “*Bifaga*”.

Concerning terrestrial wildlife, several species of large and small mammals are found in the project area and its periphery. These include antelopes or Impala (*Aepyceros melampus*), boar (*Sus scrofa*), hare (*Lepus timidus*), doe (*Hippocamelus* sp.), porcupine (*Sus scrofa domestica*), pangolin (*Manis tricuspis*), greater cane rat (*Thryonomys swinderianus*), striped ground squirrel (*Xerus erythropus*), etc. According to the people met during the surveys conducted, some species have now become rare, or extinct. This is true of buffalo (*Synecerus caffernanus*), gorilla (*Gorilla gorilla*), panther (*Panthera pardus*), mandrill (*Papio sphinx*), giant pangolin (*Manis gigantea*), and elephant (*Loxodonta africana*).

The rapid expansion of settlements and development of traditional tree felling for firewood production and sale destroy vegetation which provides a habitat for wildlife. The destruction of wildlife habitats reduces the wildlife population. Trafficking in wildlife and poaching near settlements also contribute to reducing the wildlife population.

Protected Area

There is no protected area in the direct project impact area.

4.3 Human Environment

4.3.1 Demography

The project area covers some twenty sub-divisions and a population estimated at 1 575 444:

- **Centre Region:** It is one of the most populated regions of Cameroon. With a population of 3 098 044 (2005 GPHC), it ranks as the country’s second most densely populated region after the Far-North Region. It covers a surface area of 68 953 square kilometres, representing a density of 50 inhabitants per square kilometre. The Centre Region has the longest project road section with 195 kilometres. Its population is made up of the Ewondo, Bene, Eton, Mbida-Mbani, Manguissa, Bassa, Yambassa, Bafia, Sanaga and Banen people. The Bafia, particularly the Yambassa, were the first occupants of the Babimbi region.
- **West Region:** The West Region covers a surface area of 13 892 square kilometres. With a population of 1 720 047 inhabitants, it has one of the highest population densities in Cameroon, which is 123.8 inhabitants per square kilometre. The project road stretches over some 121 kilometres in the West Region. The indigenous people of the West Region are the Bamiléké. The major towns linked by the project road are Bangangté, Batoufam, Bayangam, Bandjoun, Bafoussam, Mbouda and Babadjou.

4.3.2 Organization and Management of Local Affairs

In addition to the administrative organization, there is traditional and customary authority based on social entities defined in space. At the social level, the population is organized into chiefdoms which are further divided into sub-chiefdoms, quarters and/or blocks. Family heads are responsible for land management. Land-related conflicts are generally resolved amicably between family heads. Cases that are not resolved at this level are reported to the village chief or a notable. However, it should be noted that increasingly, land issues are brought before the courts, especially in the West Region.

4.3.4 Migration

The lure of opportunities and the multifaceted economic potential of the localities crossed by the project road, as well as the search for jobs (trade, security services, farm employment, stock breeding, etc.) are the cause of the migration of people from more or less distant regions, particularly Anglophones from the North-West Region, and Hausa and Fulani from the country's northern regions. Thus, the Fulani are responsible for the development of cattle breeding in the highlands of the West Region and the Mbam and Sanaga plains. Babadjou has a large Bororo community estimated at more than 100 people.

4.3.5 Customs and Traditions

Overall, the customs and traditions in the various cultural areas along the project road distinguish themselves through various facets such as music, traditional dances and instruments; culinary art; local languages; costumes; museums and galleries; tales and legends; rituals and cultural ceremonies; cultural events and festivals, housing and architecture, myths and beliefs, as well as sacred days and places.

4.3.6 Sacred Sites

Sacred sites include churches, tombs and other sites considered as such by the population. Sacred sites are sometimes found within ten metres of the road. Five sites were identified, with two in Bandjoun (Pk 268 + 000) and three in Bamessingué (Pk 298 + 700). In the West Region, some trees are considered to have "mystical powers" and thus revered for their virtues (capacity to predict happy or sad events, pharmacopoeia, etc.). One of such trees was identified in Bandjoun. In the Centre Region, one of the trees most frequently cited as sacred is the Moabi.

4.3.7 Socio-economic Activities

4.3.7.1 Overview

Field surveys helped to establish that the labour force in the villages located along the project road is mainly composed of farmers, backyard flock breeders, craftsmen and other petty traders. The secondary sector comprises bricklayers, carpenters, drivers, saw millers, mechanics, stone breakers, etc. Like elsewhere, youths (15-35 years old) make up more than 50% of the population of the villages located along the road. This population segment constitutes a potential for the development of these villages and a local labour force that can be hired for the execution of road rehabilitation works. These people engage in various activities for their livelihood. Like other major towns in Cameroon, the towns crossed by the project road are centres of various economic activities dominated by the informal sector and characterized by an influx of youths who have left their villages in search of paying jobs.

4.3.7.2 Agriculture

Most people are engaged in farming, which is carried out using traditional methods and is the main source of family income. Collected data show that agriculture employs about 70% of the labour force in the villages located along the project road and is the source of livelihood for more than 95% of the total population. It involves the cultivation of market garden crops, food crops and cash crops. The market garden crops cultivated are tomatoes, cabbage, pepper, lettuce, black nightshade, etc. These crops are cultivated all year round in vast fertile lowlands in the Centre and West Regions. The food crops cultivated include plantain, cocoyam, taro, yam, groundnuts, sweet potatoes, beans, cassava, maize, etc. Irish potatoes are cultivated in mountain and in irrigated lowland areas, particularly in the West Region. Perennial crops include fruit trees (plum, mango, avocado, orange, grapefruit, pawpaw, mandarin, cola nut, etc.) and raffia. The cash crops cultivated are coffee and cocoa whose production has declined due to the slump in sales in the 1980s and farmers' lack of interest in the cultivation of these crops since then.

4.3.7.3 Other Activities

Bush meat trade is flourishing in the project area. This is the case in Kon Yambetta and some localities of Nde (Tonga and Bangangté). Bush meat markets attracting travellers have developed in Tonga, Bangangté and Makénééné. The bush meat sold here includes that of pangolin, porcupine, palm squirrel, monkey, hedgehog, etc. Commercial facilities have been developed along the project road. The agro-pastoral potential of some localities has transformed them into major purchasing poles for foodstuffs and fruits (the markets of Bafounda, Mbouda Bamessingué and Babadjou for avocado) depending on the season. Many traders travel to these localities to buy truckloads of products on market days.

4.3.8 Access to Basic Infrastructure and Services

- **Drinking Water:** The various “drinking” water supply systems used along the road section include boreholes, developed wells, developed or undeveloped water sources, streams and even rivers. It should be noted that there are several SCANWATER towers, but almost all have stopped functioning. However, access to drinking water remains a problem for the population in several villages near the road. There is a serious problem of inadequate drinking water supply in all the localities crossed by the project road. Even towns with the conventional CAMWATER network like Mbouda, Tonga, Bafoussam, Bafia and Yaounde do not have constant drinking water supply. The numerous water points developed do not provide good quality water or function in an irregular manner or have completely broken down, and the people are obliged to fetch water from nearby rivers.
- **Electricity:** Several types of energy are used by the population along the project road, namely electric power, cooking gas, kerosene, wood, charcoal, etc. Kerosene is used for lighting in localities without electric power supply. Kerosene is also used in urban areas during power outages. In rural areas in general, wood is the only source of energy used for cooking. There is need to sensitize the local population on the use of improved stoves to reduce pressure on wood resources.

- **Education:** There are 19 public primary schools, a high school, and a private nursery school in Ntui municipality. Besides the grammar high school, there is a technical high school and a Government Teachers' Training College (ENIEG) in Ntui. Most of the teachers transferred to these schools live in Yaounde and travel regularly to and from their place of residence and work station. The state of RN15 and dysfunction of the ferry result in the scarcity of means of transport, thus increasing transportation cost. Consequently, teachers are not always present in classrooms. In Yoko, there are four full cycle Francophone primary schools, two of them public schools and two denominational schools, and two nursery schools.
- **Health:** The existing health centres in most of the rural areas along the road lack technical and operating equipment. Respondents in semi-structured interviews confirmed this information. Though the hospitals in towns and urban areas (Yaounde, Bafia, Bafoussam and Mbouda) have the minimum facilities required (radiology, theatres, laboratories, etc.), rural health facilities (sub-divisional health centres, integrated health centres and denominational or secular private health centres) lack or have inadequate equipment. The common diseases enumerated by the population and health workers interviewed are malaria, faecal peril diseases (dysentery, typhoid fever, diarrhoea, etc.), STIs/AIDS, respiratory tract infections and filariasis. There are occasional cases of malnutrition among infants and children.

4.3.9 Access to Local Communities

The degradation or failure to upgrade some access roads to local communities jeopardize the sustainability of the road, cause traffic accidents, contribute to early deterioration of the vehicles of users and complicate the mobility of residents. It is therefore very necessary to upgrade these access roads.

4.3.10 Solid Waste Management

Seven uncontrolled waste disposal points were identified along the road, of which one before the main Obala junction, one in Ombessa, two in Bafia (Pk 112 + 800 D and Pk 113 + 000 G), Pk D and 000G), one at the entrance to the Tonga market (Pk 198 + 250G), one in Bayangam and one in Babadjou. Discussions with local residents helped to establish that municipal council authorities are aware of the existence of these dumping grounds and that the waste is simply burned in open air when they are full. This uncontrolled management of waste poses four problems: (i) congestion of road shoulders; (ii) emission of greenhouse and toxic gases during burning; (iii) risk of degradation of the road by heat due to fire; (iv) risk of clogging gutters and other drainage structures, exposing the road to destruction by water.

4.3.11 Gender and Specific Activities for Women

The project impact area is characterized by widespread deterioration of basic infrastructure (feeder roads, markets, roads, schools, health centres, drinking water supply systems, etc.) and scarce means of transport, compounding the situation of women and increasing the burden of their daily chores (fetching of water, transportation of products from farms, etc.). The working sessions held with the representatives of women's groups and associations helped to mainstream their concerns into the related facilities to be constructed under this project. These include: (i) the construction of multi-purpose gender centres (MGCs) to support the empowerment of vulnerable women by enhancing their access to alternative energy sources and developing employment

opportunities and income-generating activities through multi-purpose empowerment platforms; (ii) the provision of material kits to women for the processing of agricultural products; (iii) the rehabilitation of socio-economic infrastructure (community markets and multipurpose drying areas); (iv) the construction of boreholes to facilitate access to drinking water; and (v) the construction of feeder roads to ease rural mobility.

5. ANALYSIS OF ALTERNATIVE SOLUTIONS

The technical baseline study analyzed different scenarios from the economic, environmental and social standpoints to determine the best possible alternatives.

Opting to not implement the project (no-project alternative) would be tantamount to partly “forgetting” this major Cameroonian and sub-regional road in an advanced state of degradation. Thus, to achieve the objectives assigned to the project by the national authorities and address the problems it aims to resolve, the “no-project” scenario is not to be recommended insofar as it runs counter to the economic and social development policies prioritized by the Government.

Based on technical, economic, environmental and social criteria, it was decided that the project road will closely follow the existing alignment, except accident-prone areas requiring corrections.

The alternative retained is the most optimal environmentally and socially because:

- (i) it limits expropriation by following the original alignment (except for the correction of accident-prone areas);
- (ii) it incorporates reuse/recycling of part of the materials of the existing pavement structure to reduce the imprint of the road on natural resources.

The pavement structure will be chosen based on the results of the ongoing engineering study. A final decision will be taken during project appraisal.

6. POTENTIAL IMPACTS AND MITIGATION AND OPTIMIZATION MEASURES

6.1 Direct Negative Impacts

6.1.1 Worksite Preparation and Construction Works Phase

6.1.1.1 Biophysical Environment

- **Impact on air quality:** Clearing and earthmoving works, the construction of the carriageway and movement of vehicles on the road while work is in progress will generate dust, gaseous emissions, including carbon dioxide, as well as carbon monoxide from unburnt hydrocarbons. The air pollution may: (i) reduce drivers’ visibility and increase accidents; (ii) increase cases of respiratory and eye infections among unprotected workers and residents; and (iii) reduce photosynthetic activity due to the deposit of particles on plant leaves.
- **Impact on soil structure** (compaction, erosion, and loss of soil fertility): Bare soil could be seriously affected by surface erosion if nothing is done since it has little organic matter and plant cover to slow down surface water run-off.

Furthermore, the movement of construction machines will contribute to soil compaction resulting in soil sealing and loss of fertility, particularly in and around deviation areas and access roads to quarries and borrow pits.

- **Risk of physical and chemical pollution of water and soil:** The road section to be rehabilitated crosses at least twenty-five shallow water points (springs, ponds, swamps, streams and rivers). During the construction phase, more or less significant quantities of some dangerous products (fuels, lubricants, drain oil, and tar) may pollute these water sources. In addition, uncontrolled water drainage and erosion may affect river turbidity levels and sedimentation. Lastly, the production of bitumen waste, if not correctly managed, could contribute to water and soil pollution.
- **Impact on water quantity:** Water is available in this region, but the local population use some of the rivers for various purposes, including drinking water. ESIA results show that most of the surface water is not safe because it is polluted from the microbiological and bacteriological standpoints (mainly human excreta and household garbage). Demand for water will increase significantly during construction works (construction, watering/compaction, etc.) and risks of pollution during construction work exist, which could exacerbate existing problems.
- **Impact on wildlife:** Wildlife will be disturbed by the construction site as the noise of equipment, the presence of labourers, especially construction machinery, will affect the peace of animals. Furthermore, road rehabilitation site workers will certainly indulge in the consumption of game which is generally cherished by people from outside the localities, increasing the demand for game and hence encouraging poaching. Poaching activities could increase in localities such as Bayomen, Makénéne and Tonga.
- **Impact on plant life:** The clearing/release of rights-of-way, general construction site installation, and the exploitation of borrow areas and quarries will affect vegetation cover. The behaviour of the labourers is also likely to destroy plant life in some areas (trampling, damage to trees, uncontrolled clearing, felling, uprooting, mutilation and/or burning of protected forest species and sacred groves, etc.). Given that construction works will be carried out on a road whose right of way has already been released, the felling of trees will be limited. Furthermore, the exploitation of quarries and existing or former borrow areas, as well as the use of former bypasses will limit such impact.

6.1.1.2 Human Environment

- **Expropriation:** The road and its related works require that the right of way be released, hence the need to displace and resettle the population. The area to be expropriated is the site for the construction of the interchange at Obala. In all, 119 people will be affected by the project. The inventory of affected property and assets helped to identify two parcels of land with title deeds or being registered, 21 houses, 1,039 industrial, perennial, etc. crops, and 19 items of cultural property (graves) (see summary of Abbreviated Resettlement Plan attached as annex for more details).

- **Disruption of population’s mobility and sound nuisances:** During the rehabilitation of the road and construction of the interchange at Obala, the movement of vehicles will be disrupted due to the occupation of the roadway by construction machines and stored materials. Such disruption will be significant as a result of the very heavy traffic on this road. Vehicles will have to stop completely for a while at the works site. Traffic flow will be alternated, with speed limitation and a possible deviation. The consequences of traffic disruption will include longer travel time and other disruptions in the daily activities of the road users.
- **Impact on the health of workers and the populations living along the road:** The arrival of workers from different places in the project area will probably increase the prevalence rate of sexually transmitted infections (STIs) and HIV/AIDS. The organization of works could generate some health risks for workers using noisy (auditory disorders leading to progressive deafness) and gas-emitting (respiratory problems) machines. Workers may be involved in accidents during movement between their place of residence and place of work. The various site and camp solid and liquid wastes could affect the quality of life of the population through pollution of drinking water sources. In most localities crossed by the road, it was generally noted that the population have the poor habit of drying foodstuffs on roadsides despite banning by the authorities. These foodstuffs are likely to be contaminated by chemical products from the distension of surface coating (lead, carbon monoxide, hydrocarbon, etc.) and gases emitted by vehicles. These foodstuffs present serious health risks for consumers.
- **Risk of conflict:** Many types of conflicts may occur, especially between the project and the population, between the employer and employees, etc. These conflicts could result from many factors, namely: (i) non-compliance with the customs and traditions in their new living environment; (ii) absence of communication and awareness-raising campaigns; (iii) non-compliance with the compensation procedures for damaged property and failure to consult the population living along the road prior to expropriation and deviation opening procedures; (iv) non-compliance with employment conditions between employees and the project manager, etc.

6.1.2 *Operation Phase*

6.1.2.1 *Biophysical Environment*

- **Impact on Wildlife:** There will be no particular or additional impacts on wildlife compared to the existing road. They will therefore include impacts induced by the consumption of game in the markets already existing along the road.
- **Impact on Flora:** This impact will be low compared to the “no project” situation. However, improving the road and constructing related access roads and other feeder roads will enhance socio-economic development. This could generate the cumulative effects of creating or reinforcing some activities that affect flora, specifically increased anthropogenic pressure on forest resources, especially to meet firewood, timber, farming land extension, etc. needs.

- **Impact on Drinking Water Resources and Soil:** The wear of road surfacing through friction caused by continuous traffic flow produces a large quantity of very fine dust. For 7.5 m-wide roads, the pollution charge is estimated at 0.66 kg/m². The biological oxygen demand (BOD) measured after five days (BOD₅) of this wear is generally minimal, while the chemical oxygen demand (COD) is quite high in areas of heavy traffic. Although, so far, there are no reliable long-term values showing how gas-emissions by vehicles contribute to polluting rainwater effluents in urban areas and along roads, this risk exists. Wear through friction of brake linings and metal components mostly generate inorganic matter containing quite substantial quantities of heavy metal such as copper, nickel, chrome and lead. Considering the practices in the project area (drying of foodstuffs on roadsides), it is crucial to take measures to step up awareness-raising among the population. Furthermore, poorly managed or eliminated solid wastes will have potential impacts on these resources and sustainability of the road (see section on climate change).
- **Impact on the air:** see section on climate change.

6.1.2.2 *Human Environment*

- **Risk of Road Accidents:** At the end of works, traffic will be fluid on the road and the movement of people and goods will intensify, especially as the road section links up heavily populated localities such as Bafoussam, Bafia, Mbouda, etc. These localities also produce abundant agricultural products, which induces dense heavy and liaison vehicle traffic. The intensification of traffic may be a factor of frequent road accidents. Another accident risk aggravating factor is the practice of drying foodstuffs on sidewalks along the road by the population. They are exposed, at any time, to the risk of being hit by vehicles driving through the various localities at high speed. This impact is indirect, real and could occur throughout the service life of the road. It has a long-term scope. Its extent is local because it occurs at a precise place, at village crossings and at sites identified as accident-prone. It is therefore a major risk.
- **Human Health Risk:** Given the practice of drying foodstuffs on road shoulders and considering the potential impacts on water resources and the soil described above, consumers of such foodstuffs are exposed to health risks in the long run.

6.2 *Positive Direct Impacts*

The positive impacts of this road are obvious. The major project positive impacts can, however, be summarized as follows: (i) improved conditions of transporting people and goods; (ii) opening up of the hinterland and improved access to basic socio-economic infrastructure through the construction of access roads, slip roads, etc.; (iii) direct and indirect job creation during the road construction, operation and maintenance phases; (iv) improved living conditions of vulnerable population serviced by the road and related roads, as well as related facilities for the population; (v) reduced risks of accident through the correction of accident-prone areas, awareness-raising, signposting and rehabilitation of crash barriers; (vi) reduction of erosion through the rehabilitation of some engineering works; (vii) improved safety around schools located along the road; and (ix) improved access to drinking water through the construction of boreholes.

6.3 Maintenance Activity-related Impacts

Maintenance works will be carried out using GENIS method and will create jobs, albeit fewer compared to the construction phase.

6.4 Cumulative Impacts

6.4.1 Negative Impacts

The construction and operation phases of the various development projects in the region will result in the movement of people in search of jobs or any other economic activity, and increased conveyance of commodities, leading to increased traffic on the road. There will be cumulative impacts on wildlife and flora, ranging from low to moderate.

6.4.2 Positive Impacts

The road and related facilities will enhance the socio-economic development of the area and activities that depend on it. Operators and entrepreneurs will provide fresh impetus and step up production activities (agriculture, stock breeding, etc.), trade, etc.

6.5 Mitigation/Compensation and Advance Monitoring at this Phase

6.5.1 Regulatory and Administrative Measures

The measures seek to ensure project compliance with applicable regulations, as well as administrative and contractual requirements, in particular:

- ***Compliance with environmental and social regulations:*** The project should ensure compliance with national environmental regulations in force and those of AfDB in the construction and operation phases. To that end, the report on the ESIA conducted in 2013 was approved by MINEPDED and the compliance certificate was issued on 22 October 2014. The updating of the ESIA report does not alter the validity of the said certificate which runs until October 2017.
- ***Compliance with land tenure regulations:*** Given that the project requires expropriation, the resettlement plan must comply with the land tenure regulations in force in Cameroon. ***These elements are contained in the Abbreviated Resettlement Plan (ARP) prepared as a separate document.***
- ***Selection and recruitment of contractors:*** Environmental and social clauses will be included in the bidding documents (BDs). The environmental aspect of the site internal rules and regulations will also be prepared to incorporate environmental considerations in the practices of the contractor and behaviour of the employees (consumption of game, consumption of alcohol during working hours, non-compliance with hygiene rules, etc.). The contractor is required to recruit an Environmental Officer.

- ***Establishment of a Work Hygiene, Safety and Environment Committee:*** Its role will be to ensure hygiene, safety and environmental protection at workplaces. It will also raise environmental awareness among employees and ensure that they are involved in the implementation of environmental measures.
- **Fair, equitable and prior compensation** of project affected persons for property identified in the Resettlement Action Plan (RAP). The estimated budget is CFAF 93 368 162 for RAP activities and CFAF 30 000 000 for monitoring, making a total of CFAF 123 368 162. This amount will be paid by the Government of Cameroon prior to the commencement of works on the lot concerned.
- ***Contractor's commitments and deliverables:*** The contractor responsible for works will prepare a quality assurance plan (QAP) including environmental protection clauses with which the contractor undertakes to comply. It will be recommended that each contractor for each lot should submit a site environmental protection plan (SEPP) and a site environment management plan (SEMP) for approval by the environmental expert of the control firm 60 days after notification of the contract. These documents should at least contain: (i) the organization chart of the staff assigned for environmental and social management, with an indication of the project environmental and social officer; (ii) the description of the methods for reducing impacts on the biophysical and socio-economic environment; (iii) the plan for managing and restoring borrow areas and quarries, including management of explosives; (iv) the water resources management plan; (v) the erosion, drainage and sedimentation management plan; (v) the workers' camp establishment plan showing areas for storing and parking equipment; (vi) the solid and liquid waste management plan; (vii) all the site protection measures and the implementation programme; (viii) the location and general site plan drawn to scale; (vii) the description of methods for preventing and reducing pollution, unwanted fires, road accidents, etc.; (viii) health infrastructure and access by the population in case of emergency; (ix) site regulations on environmental protection and safety; (x) the provisional plan for site development upon works completion and handing over of any borehole facilities to the local population.

6.5.2 ***Construction Phase***

6.5.2.1 ***Biophysical Environment***

- **Air quality protection measures:** The contractor is bound to take all appropriate measures to avoid soiling site surroundings, roadways, shoulders and sidewalks with dust, spoil earth, mud and materials from works. The contractor's SEPP will contain all these measures, and will be approved by the control firm and MINTP prior to commencement of works and monitored by them during works.
- **Protection of soil structure:** Erosion control measures have been taken such as growing of plants on slopes, tree planting on roadsides and evacuation of rainwater that could cause soil erosion through run-off. In quarries and campsites, the operator is required to establish and maintain erosion control measures, refill and/or reforest all degraded land. Other measures and precautions will be taken.

- **Water resource and soil protection:** Surface water, as well as water tables, will be protected against pollution mainly through the banning of any spilling or discharge of waste water, sludge, molten metal, hydrocarbons and all types of pollutants into wells, boreholes, water tables, streams, brooks, road ditches or even on the ground. Consequently, workers' camps will be equipped appropriately (septic tanks, appropriate fuel pumps, etc.). Regarding resource quantity management, boreholes will be constructed for the population. This will help to offset the inconveniences caused during the works (sampling) and ensure continuous drinking water supply. The selection of villages to benefit from these measures will be confirmed during project appraisal in collaboration with the Government of Cameroon.
- **Landscape impact reduction measures:** To mitigate the impacts of extraction sites on the landscape, it will be necessary to: (i) select invisible attack points of the road, gradually clear the site as operation progresses; and (ii) limit and orientate operation in order to achieve a "hollow tooth" operation, develop quarry surroundings (site entrance, access road, etc.) with topsoil and plants. For laterite and sand quarries, works to reduce impact on the landscape must be carried out as soon as possible and, in any case, help to conceal the degradation caused by the operation as much as possible. Accordingly, landscape developments are provided for in urban road networks, especially in Bafoussam.

6.5.2.2 *Human Environment*

- **Compensation:** Monitoring of RAP implementation and functioning of the Disputes Settlement Committee. Given that submission of evidence of payment of compensation is a condition precedent to works start-up, it is important to ensure optimal RAP implementation.
- **Access for the local population and durability of the road:** The report on the environmental and social impact assessment prepared by EGIS-Cameroun had identified 310 access points for the local population, including 115 ramps, 55 entrances to homes, 18 gutter sections to be covered with concrete paving and 122 approaches to compounds or small neighbourhoods. Some of these access points were upgraded during the rehabilitation of the Yaounde-Ebebda and Bafoussam – Babadjou sections. They will therefore be upgraded or rehabilitated to facilitate people's access to their homes and limit the destruction of the road by the local population.
- **Awareness-raising on road safety and environmental protection:** An NGO or other specialized entities will be responsible for carrying out this activity, preferably one month before works start-up, during the entire construction period, and one month after the end of construction works. It will sensitize the local population, employees and road users on: (i) health problems (STI/HIV-AIDS, malaria, dangers of drying foodstuffs on the road and use of drying trays); (ii) road safety and road protection; and (iii) environmental protection.
- **Human safety measures:** To ensure the safety of workers, the local population and road users, the contractor is required to take appropriate measures to prevent any risk of accidents: road accidents, unwanted fires, explosions, wrong handling

of site equipment, etc. All recommendations on human safety during the works focus on signposting, access control, sensitization, prevention of unwanted fires, and related facilities. To that end, a sensitization campaign will be organized by a specialized NGO (see above).

- **Cultural property protection measures:** Apart from graves, no cultural property or site will be directly affected. This notwithstanding and in addition to the proposed mitigation measures, the environmental and social clauses will concern the accidental discovery procedure, in accordance with the laws and regulations governing cultural property and antiques in Cameroon.

6.5.3 *Road Operation Phase*

- **Road safety measures:** Town and village crossings, which are dangerous areas for road users and the local population, will be developed with great care (road signs, speed brakes, 2 m-wide sidewalks, widening of shoulders, parking lanes in all villages, protection of entrances to schools, etc.).
- **Measures for protecting the health of the population:** The establishment of drying areas, as well as the construction and equipping of agricultural product processing units (UTA), will help to mitigate the effects of emissions and limit the use of road shoulders for drying foodstuffs. The construction of parking lanes/rehabilitation of markets will help to: (i) prevent overcrowding of markets on market days; and (ii) reduce road accidents at market places. The construction of walls to protect students and pupils will help to: (i) keep students and pupils within school premises and away from the road during break; (ii) mitigate the impact of noise; (iii) reduce the impact of vehicles which could accidentally skid off the road where there are schools.

7. **RISIDUAL IMPACTS AND ENVIRONMENTAL RISK MANAGEMENT**

7.1 *Negative Residual Impacts*

No moderate or highly negative residual impact is expected after implementation of the mitigation measures. Negative residual impacts will be minor, and will not require any special measures.

7.2 *Environmental Risk*

The environmental risk will be mostly related to the accidental spill of hydrocarbons, bituminous products, explosives and other road construction substances. Measures will concern: sensitization and training of site workers and occasional teams in rapid intervention techniques in case of disaster, security measures to be observed in dangerous or risky areas, and sensitization of the local population on health risk prevention and road safety. All these measures will be described in detail in the documents to be submitted by the contractor and approved by the control firm before works start-up; the measures are: (i) the waste management plan; (ii) all site protection measures and implementation programme; (iii) the methods of preventing and reducing pollution, unwanted fires and road accidents; (iv) health infrastructure and access by the population in case of emergency; and (v) site regulations on environmental protection and safety.

8. MONITORING PROGRAMME AND INSTITUTIONAL RESPONSIBILITIES

8.1 *Surveillance Objectives and Content*

Environmental surveillance seeks to ensure effective implementation of environmental measures. Its main objectives are to: (i) ensure compliance with the laws, regulations and strategies in force within the services involved; (ii) comply with Government guidelines on the orientations in the environmental and social impact assessment report; (iii) present an environmental assessment in the event of impacts not provided for in the ESIA and propose appropriate solutions; (iv) help the promoter to react promptly to the shortcomings of proposed mitigation measures or any other unforeseen disruption of the environment; (v) apply sanctions and penalties as stipulated in the various contracts between the promoter and third parties.

To ensure proper project environmental surveillance, the phases to be followed are: (i) preparation of the surveillance programme; (ii) definition of operations to be controlled; (iii) identification and location of sites to be controlled; (iv) inventory and understanding of the environmental measures proposed in the Environmental and Social Impact Assessment (ESIA) report.

Operations requiring surveillance

On the whole, the operations which will require environmental surveillance include:

- compliance with site environmental regulations;
- presence of mobile and/or fixed road signs at entrances to sensitive places (workplaces and built-up areas, etc.);
- control of the management of storage areas for waste materials (sewage products, spoil earth, etc.);
- operation and restoration of borrow areas, as well as site facilities;
- compliance with STI/AIDS prevention measures;
- payment of compensation for damaged property and crops;
- wearing of appropriate personal protection equipment by staff;
- collection of waste oils as well as all other dangerous wastes.

8.2 *Surveillance and Monitoring Actors*

Contractor's Environmental Officer: The *contractor's* Environmental Officer will be responsible for implementing certain measures. However, the officer will be the key environmental surveillance actor. In fact, although the environmental officers of contractors will ensure the implementation of certain measures, they will also be the key surveillance actors of the implementation of many other measures which will be generally implemented by the site foremen and garage managers.

Control Mission Environmental Officer: Control mission environmental officers will be the main environmental surveillance agents. Their role will be to ensure smooth implementation of the environmental measures. To succeed, they must work in close collaboration with their counterparts in works implementation enterprises.

MINTP's Infrastructure Environment Protection Unit (CPEI): The CPEI will supervise environmental surveillance through monthly field trips and/or monthly meetings chaired by the Head of the Procurement Service. It will also be responsible for receiving and reviewing half-yearly reports prepared by the Control Mission before they are forwarded to the Ministry of Environment, Nature Protection and Sustainable Development (MINEPDED), in accordance with the regulations in force.

During the Bank preparation mission, MINEPDED recommended that an Environmentalist in the Central Services, that is MINEPDED's ESMP Monitoring Sub-department, should be designated to monitor the implementation of the project ESMP, given that the project concerns two regions of Cameroon. Notwithstanding monitoring at the central level, the Divisional Delegations of MINEPDED and of the Ministry of Forestry and Wildlife (MINFOF), whose powers cover the areas of forestry, wildlife and nature conservation, will be involved in monitoring, in accordance with Decree No. 2013/171/PM of 14 February 2013. At the practical level, a monitoring committee comprising representatives of the main Ministries, alongside representatives of other services depending on the issues to be discussed, has been established. During each monitoring mission, the site and control mission environmental officers will be involved in monitoring. The activities of the committee should be scheduled to coincide with site meetings. To that end, half-yearly monitoring reports should be submitted to the said Sub-department, in accordance with the national regulations in force. During the construction phase, monitoring mission costs will be borne by MINTP. During the warranty period, monitoring missions will be conducted every four months, also at the expense of MINTP. At the end of monitoring, a stock-taking mission will be conducted for each work. After this mission, the services concerned will take over as part of their official activities. In this regard, the cost of monitoring should be incorporated in the operating costs of the services concerned. This arrangement was agreed upon with MINEPDED.

Local Population: The role of the population living along the road in environmental surveillance will be to ensure that the environmental measures are properly implemented. To ensure that the project activities do not degrade their living environment, the local population should participate in environmental surveillance. To that end, they should know their rights and duties, and all the environmental guidelines to be observed in order to avoid making unfounded claims that may be the source of conflicts. They should, as much as possible, denounce any failure to comply with the proposed measures not properly implemented.

Surveillance Tools

To succeed in their surveillance missions, the control mission environmental officers will design appropriate environmental surveillance tools, in particular:

- environmental identification form (FIE);
- indicator form;
- environmental logbook;

- preventive action form;
- reports of sensitization meetings;
- environmental non-compliance form;
- correspondence.

8.5 Reports

Quarterly environmental and social surveillance reports will be prepared by the control mission environmental officers. The reports should summarize their activities and the difficulties encountered, and be submitted to AfDB.

Half-yearly reports should be submitted to MINEPDED (Article 27(3) of Decree No. 2013/171/PM of 14 February 2013 laying down conditions for conducting environmental and social impact assessments). Following the opinion of the Inter-ministerial Committee on the Environment, MINEPDED may adopt remedial or additional measures to reflect impacts not initially or insufficiently assessed in the ESIA.

9. PUBLIC CONSULTATIONS AND INFORMATION DISSEMINATION

Public consultation in Cameroon is governed by Article 11 of Decree No. 2005/577/PM of 25 February 2005. Accordingly, the stakeholders concerned were consulted during the conduct of the ESIA in 2012 and during its updating in 2015. In accordance with established procedure, relevant and sufficient project information was communicated beforehand to the stakeholders. Sub-divisional officers played a crucial role in issuing hand-delivered messages which were sent to the chiefs of the villages concerned.

9.1 Public Consultations in 2012

During the preparation of the ESIA report in 2012, public consultations were held between February and April 2012. Fourteen meetings were thus organized. They brought together a total of 579 persons, with a significant participation of women and local authorities. The minutes of these consultations were taken and recorded in the Annexes to the ESIA. It should be noted that the nature of the works as assessed by the 2012 ESIA did not entail resettlement (since the interchange did not form part of the project components).

9.2 Public Consultations in 2015

Twenty-three (23) public consultation meetings were held along the road under rehabilitation, with seventeen (17) meetings on the Yaounde-Bangangté section and six (6) meetings on the Bangangté – Babadjou section.

Divisional officers, sub-divisional officers, village chiefs, the population and the team of MINTP and ARFAD staff conducting the assessment attended the meetings. The minutes of the consultations are presented in the Annexes to the ESIA reports.

A specific consultation for the PAPs of Obala was conducted on 16 September 2015 (see the Summary Resettlement Plan attached as Annex).

9.3 Main Outcomes

The main outcomes achieved are the participatory identification of impacts (negative and positive) with the various related measures (mitigation and optimization). In addition, grievances were expressed by the population. On the whole, the population welcomed the project. During the public consultation sessions in 2012 or 2015, the participants were very cooperative and enthusiastic about the initiation of the project.

The major positive impacts identified are: (i) facilitation of the movement of people and goods; (ii) development of economic activities and higher incomes; (iii) job creation/reduced unemployment; and (iv) reduction of the risk of accidents. The negative impacts are: (i) pollution and congestion of nearby areas by blocks of tar stripped off from the old roadway; (ii) loss of time due to traffic slowdown during works; (iii) various nuisances during the works; (iv) risks of accidents; and (v) risks of destroying food crops. Most of the proposed mitigation measures were taken into account in the ESMP. Special emphasis was laid on accident-prone areas. Thus, a sub-component dealing with these issues has been included in the works.

Grievances and damages can be grouped together (without being classified by order of priority) under: (i) construction/rehabilitation and/or equipping of school and health infrastructure; (ii) development of rural roads, feeder roads and access roads, etc.; (iii) construction of water points; (iv) support to women, youths, etc.; and (vi) public lighting.

As indicated by the Bank during the preparation mission, all the grievances will be collected and prioritized, and selection will depend on available resources. The adopted proposal will form part of the related facilities component.

9.4 Future Consultations

The participatory approach and the consultation of the population will continue during project appraisal and implementation, especially: (i) validation of the compensation plan; (ii) installation of the site and works start-up; and (iii) establishment of the baseline situation and project impact monitoring and evaluation. The consultations should help to implement the measures recommended in the Environmental and Social Management Plan (ESMP).

Accordingly, the project provides for:

- a communication on the project which will concern the key project stakeholders (population, local and central authorities, NGOs, etc.) at all the project phases, particularly site installation, works and maintenance. As a result, this plan will cover ESMP implementation with special emphasis on issues relating to biodiversity management, site environmental protection, management of inconveniences, etc.
- a Consultation and Dialogue Plan (CDP) to accompany the Abbreviated Resettlement Plan (ARP). This plan will define the main channels of communication with the population in general, and the affected persons, in particular.

10. SUMMARY OF ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN COSTS

Table 2 below presents the summary of the costs of project environmental and social measures.

Table 2
Summary Costs of Environmental and Social Measures

ENVIRONMENTAL AND SOCIAL MEASURES	Cost (CFAF)
Annual remuneration of Contractor's Environmental Officer	18 000 000
<i>Soil, Landscape, Surface Water and Groundwater Protection</i>	3 600 000
Building the capacity of MINTP Staff	45 000 000
Building the capacity of ESMP Monitoring Committee Members	71 960 000
Construction of parking areas/Rehabilitation of markets	480 000 000
Protection of schools	158 100 000
Construction of drying areas, and construction and equipping of agricultural product processing units (UTA)	138 000 000
Sensitization	226 300 000
RAP Implementation Cost	123 368 162
ESMP Monitoring Cost	100 000 000
TOTAL	1 364 328 162

Source: ESIA Report (2015)

11. CLIMATE CHANGE

11.1 Major Challenges

At national level

According to the National Communication on Climate Change (2005), the areas considered as climate change vulnerability areas are the coastal and Sahelian zones. The most significant negative impacts are expected in the agricultural and livestock sectors in the Sudan-Sahelian region, mangroves and industrial infrastructure in the coastal zone. The coastal zone generally concerns the littoral region and the maritime areas of the South and South-West regions. The project is located outside this zone.

In the project area

Based on the vulnerability analysis conducted by the Bank's Climate Safeguards System, the project has been classified in Environmental Category 2:

- **Abundant rainfall:** Abundant rains foster storm water erosion which mainly results in the creation of gullies. Consequently, when potholes are formed on the roadway, lack of maintenance and rapid intervention, combined with heavy rainfall, aggravate road degradation and affect its durability.
- **Clogging of gutters:** The local population's practices of ploughing, creating makeshift access roads (clogging of gutters), dumping domestic and plant wastes, etc. obstruct gutters. The obstruction of gutters causes run-offs on the road surface, hence its accelerated degradation. This situation is worsened by heavy rains in the project area.

- **Greenhouse gas emissions:** Substances emitted in the form of gas, particularly nitrogen oxides NO and NO₂, stand at 10 kg/year per vehicle. Annual unburnt hydrocarbons stand at 38 kg per vehicle. The improvement of the state of the road will generate slightly more traffic (2% annually), with the resulting increase in the number of vehicles which are emission sources.

11.2 *Adaptation*

The project has incorporated these challenges at various levels:

- evaluation of the state of all water supply facilities;
- rehabilitation/construction of those that are in a critical state and cannot be used, as well as cleaning/clearing of those that are clogged, cleaning of outlets, etc. As a result, the Bill of Quantities includes the construction of water slopes on embankments, covered gutters at town crossings and open gutters in the countryside. This will be accompanied by sensitization on environmental protection (avoid clogging gutters with all types of solid wastes, disorderly installation, etc.). Evacuation facilities should be designed to reduce soil stripping by rainwater;
- run-off control is a critical factor for road durability. Such control requires not only the construction of evacuation facilities, but, above all, their maintenance in a regular operating state. The road management and maintenance by service level (GENIS) methods have been proposed in the project for road rehabilitation and upgrading works contracts to optimize the use of Road Maintenance Fund resources. Such maintenance will be carried out over a ten-year period and contribute to reducing the impact of climate on road durability;
- sensitization of the population on the protection of the road network: sensitize municipal councils (Bafia, Makénéne and Mbouda) on waste management and suggest to them the creation of garbage dumps out of the right-of-way; involve local populations in road maintenance.

The proposed measures are consistent with those proposed in the Bank's Adaptation Review and Evaluation Procedures (AREP) for road projects. The costs of these measures have been included in the cost of ESMP for building capacity to monitor climate change measures.

11.3 *Mitigation*

The construction of the road will help to increase average traffic speed, thereby enabling more fluid traffic and generally lower emission ratios than those of current speeds (atmospheric emission ratios are generally inversely proportionate to traffic speeds). The upgrading of urban road networks and the construction of the interchange will contribute to further increasing traffic speed. In addition, the project provides for reforestation/planting of at least 5 000 trees and landscape developments in the towns concerned by urban road works. This will, at least, contribute to sequestering part of the emissions induced by the road. However, on this last point, tree species will be selected in collaboration with MINFOF services of the divisions concerned. Monitoring will be conducted in three phases:

- ***During the works:*** Monitoring will be conducted by MINTP's Environmental Unit through the Monitoring Committee which includes MINEPDED and MINFOF. The duties of this committee will be programmed to coincide with site meetings. MINTP will bear the costs of monitoring during the construction phase, including the monitoring of tree planting.
- ***During the warranty period:*** This phase is critical for plant growth. Monitoring will still be conducted by the Monitoring Committee, but after every four months. At the end of this phase, an evaluation report will be prepared by each service, including MINEPDED and MINFOF.
- ***After the warranty period:*** After this phase, the services concerned will take over as part of their official activities. To that end, the cost of monitoring will be incorporated into the operating costs of the services concerned. Regarding trees and green spaces in the towns concerned by the project, the various city councils will be responsible for monitoring, in collaboration with MINFOF services. The town of Bamenda, for example, maintains its green spaces through a contract with a specialized NGO.

In addition to these arrangements, the contract for road management and maintenance by service level (GENIS) will provide the opportunity for better monitoring of the adaptation measures described above, as well as the maintenance of trees many years after the warranty period.

12 INSTITUTIONAL CAPACITY AND CAPACITY BUILDING PLAN

Given the scope of the project and the arrival of new staff in MINTP's unit responsible for environmental issues, provision has been made to build the capacity of the staff of the said unit. The staff includes: (i) the Environmental Control Officer; (ii) the Head of the Infrastructure Environment Protection Unit; and (iii) members of ESMP divisional monitoring committees. This capacity building will, for information purposes, focus on the following themes: (i) General Notions on the Environment; (ii) Environmental Conventions; (iii) Environmental Management Institutional and Regulatory Framework in Cameroon; (iv) Procedures for Conducting Environmental Impact Assessments and Audits in Cameroon; (v) Project Environmental Impacts and Planned Environmental Measures; (vi) Environmental and Social Monitoring of Road Projects; (vii) Project Environmental and Social Monitoring Procedures; and (viii) Monitoring of Climate Change Adaptation Measures.

13 CONCLUSION

The project to rehabilitate the Yaounde-Bafoussam-Babadjou section of the Yaounde-Bafoussam-Bamenda road as presented in this assessment will have considerable negative environmental impacts, which will be mitigated or optimized, as appropriate. The possible negative project impacts during the works and operation phases generally range from moderate to high. If the proposed measures and recommendations are taken into consideration, the various project components would blend harmoniously into their environment and the project would be environmentally and socially viable.

Project Name: Transport Sector Support Programme Phase 2 - Rehabilitation of the Yaounde-Bafousam-Bamenda Road - Upgrading of the Maroua-Bogo-Pouss road and the Grand Zambi-Kribi Road

**SAP Code: P-
CM-DB0-015**

Country : Cameroon

Department: OITC

Division: OITC-1

2. INTRODUCTION

This document is a summary of the Environmental and Social Impact Assessment (ESIA) Study of the Transport Sector Support Programme Phase 2, Grand-Zambi-Kribi Road section (53 km). A separate ESIA was conducted on the Yaounde-Bafoussam-Babadjou section (241 km) and is already approved by the Bank. The assessment of this section was conducted in 2013. At the Bank's request, it has been aligned and supplemented with a comprehensive Resettlement Action Resettlement Plan (RAP) a summary of which is annexed to this document. The project has been classified under Environmental Category 1 in accordance with the African Development Bank's Integrated Safeguards System (ISS) and national regulations. This summary has been prepared in accordance with AfDB's environmental and social impact assessment guidelines and procedures for Category 1 projects.

2. POLICY, LEGAL, ADMINISTRATIVE AND INSTITUTIONAL FRAMEWORK

2.1 *Legal Framework in Cameroon*

The national legal framework governing the project's environmental component mainly comprises the following laws and regulations: (i) Framework Law No. 96/12 of 5 August 1996 governing environmental management; (ii) Decree No. 2013/171/PM of 14 February 2013 defining the conditions for conducting environmental and social impact assessments; (iii) Order No. 70/MINEP of 22 April 2005 defining the various categories of operations subject to a full impact assessment and a summary impact assessment; (iv) Decree No. 2011/2582/PM of 23 August 2011 defining the conditions for protecting the atmosphere; (v) Decree No. 2011/2583/PM of 23 August 2011 regulating sound and odour nuisances; (vi) Decree No. 2011/2584/PM of 23 August 2011 defining the conditions for soil and subsoil protection; (vii) Decree No. 2011/2585/PM of 23 August 2011 establishing the list of harmful or dangerous substances and the system of discharging them into inland waters; (viii) Order N° 001/MINEP of 03 April 2013 on the organization and operation of the Departmental Committees for Monitoring the Implementation of Environmental and Social Management Plans (ESMP); (ix) Act No. 94/1 of 20 January 1994 laying down forestry, wildlife and fisheries regulations; (x) Decree No. 95/531/PM of 23 August 1995 laying down the conditions for implementing forestry regulations; (xi) the January 1998 standards governing interventions in forest areas; (xii) Act No. 98/5 of 14 April 1998 laying down regulations governing water resources; (xiii) Order No. 39/MTPS/IMT of 26 November 1984 laying down general measures relating to occupational health and safety at workplaces; (xiv) Act No. 91/008 of 30 July 1991 on the protection of cultural and natural heritage, in view of the importance of tourism and tourist sites, and the archaeological heritage that may be discovered during works.

From the environmental standpoint, the road sector is governed by Circular No. 908/MINTP/DR on guidelines for mainstreaming environmental impacts into road maintenance; Act No. 96/67 of 8 April 1996 on the protection of national roads, which defines the road right-of-way as set forth under the laws governing State-owned lands, as well as Decree No. 2005/330 of 6 September 2005 organizing the Ministry of Public Works.

With respect to the affected property, the national legal framework governing compensation comprises Act No.85/9 of 4 July 1985 on expropriation for public purpose and conditions for compensation; Order No. 832/4.15.1/MINUH/D 000 defining the conditions for implementing Act No. 85/9 of 4 July 1985 concerning finished and unfinished buildings; and Decree No. 2003/418/PM of 25 February 2003 setting compensation rates payable for owners of cultivated trees and crops destroyed for public purposes.

2.2 *International Agreements*

Cameroon is signatory to most international and regional agreements on environmental protection, prominent among which are: (i) UNESCO's 1972 Paris Convention Concerning the Protection of the World Cultural and Natural Heritage; (ii) the CITES Convention of 1973; the 1992 Rio United Nations Convention on Biological Diversity (CBD); (iii) the United Nations Framework Convention on Climate Change (UNFCCC); (iv) the Rotterdam Convention on Prior Informed Consent (PIC) and the Stockholm Convention on Persistent Organic Pollutants (POPs); (v) the Geneva International Tropical Timber Agreement; (vi) the 2003 African Convention on the Conservation of Nature and Natural Resources signed in Maputo, aimed at ensuring the sustainable development of African economies; and (vii) Cooperation and Consultative Agreement among Central African States on the Conservation of Wildlife and the Creation of a Special Fund for the Conservation of Wildlife.

2.3 *Institutional Framework in Cameroon*

Environmental management in Cameroon is the responsibility of the Ministry of the Environment, Protection of Nature and Sustainable Development (MINEPDED). This project covers several sectors, hence the involvement of the Inter-Ministerial Committee for Validation of this ESIA Report and the Identification and Assessment Committee (CCE) responsible for assessing the affected property. The following Ministries will intervene in both bodies at various levels: the Ministry of Forestry and Wildlife (MINFOF); the Ministry of Public Works (MINTP); the Ministry of Energy and Water Resources (MINEE); the Ministry of Industry, Mines and Technological Development (MINIMIDT); the Ministry of Agriculture and Rural Development (MINADER); the Ministry of Livestock, Fisheries and Animal Industries (MINEPIA); the Ministry of Territorial Administration and Decentralization (MINATD); and the Ministry of State Property, Surveys and Land Tenure (MINDCAF).

Apart from these Ministries, project activities will involve local governments or municipalities, local village communities, local support organizations (LSOs) and the most active environmental protection NGOs in the project area, such as WWF and Nature Cameroon, etc.

2.4 *African Development Bank (AfDB)*

The Bank intervenes in the sector through the Integrated Safeguards System (ISS) comprising the following five operational safeguards:

- Operational Safeguard 1: Environmental and social assessment;
- Operational Safeguard 2: Involuntary resettlement - land acquisition, population displacement and compensation;

- Operational Safeguard 3: Biodiversity, renewable resources and ecosystem services;
- Operational Safeguard 4: Pollution prevention and control, greenhouse gases, hazardous materials and resource efficiency; and
- Operational Safeguard 5: Labour conditions, health and safety.

The other relevant policies and guidelines are applicable once they are triggered within the ISS framework, in particular:

- The Bank's Gender Policy (2001);
- The Framework for Enhanced Engagement with Civil Society Organizations (2012);
- The Disclosure and Access to Information Policy (2012);
- The Handbook on Stakeholder Consultation and Participation in AfDB Operations (2001);
- The Bank's Policy on Population and Strategies for Implementation (2002); and
- The Environmental and Social Assessment Procedures for the Bank's Public Sector Operations (2015).

6. PROJECT RATIONALE AND DESCRIPTION

3.1 Rationale

At national level, the Yaounde-Olama-Bigambo-Grand Zambé-Kribi Road connects Yaounde to the recently-commissioned Kribi Port industrial complex. It is co-financed with the Islamic Development Bank and the Abu Dhabi Fund which funded the Olama-Grand Zambé section. It is currently the shortest route between the two cities and will be useful for exports and imports transit to and from neighbouring countries, which will not have to go through the Douala Port. It is worth mentioning that, at the local level, the construction of the Yaoundé-Kribi road, which includes the Kribi-Grand Zambé section, will open up about sixty villages that are poorly connected not only among themselves but also with administrative centres.

3.2 Project Objectives and Components

The project's overall objective is to help open up and develop the agricultural potential of the country's regions as well as increase trade between them.

The project's specific objective is to enhance the service level of the transport logistics chain between the cities of Yaounde-Bamenda, Maroua-Pouss and Olama-Kribi, thus improving the living conditions of the inhabitants of these regions.

The project cost is estimated at UA 348.93 million, or CFAF 286.495 billion, financed by the Bank, the World Bank and the State of Cameroon. The Bank Group will intervene through an

AfDB loan of UA 264.349 million, representing 74.35% of the total project cost. The national counterpart funding was estimated at UA 91.194 million, or CFAF 75.847 billion, representing 25.65% of the overall project cost.

Table 1 below shows the various project components.

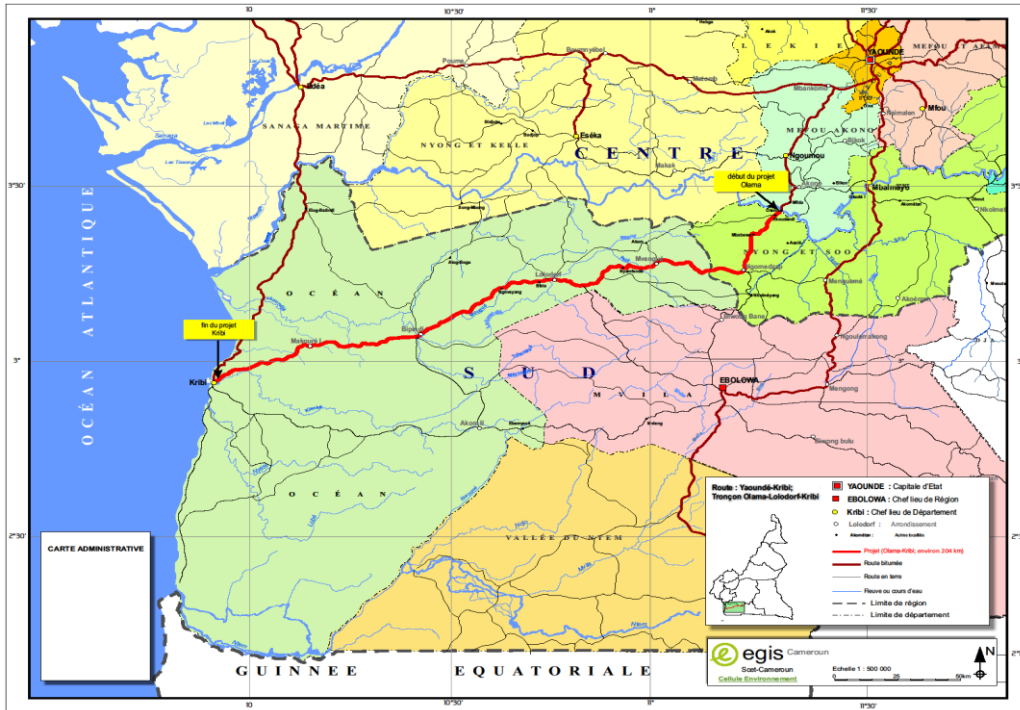
*Table 1
Programme Components*

Component Name	Description
ROAD WORKS	<ul style="list-style-type: none"> 1.9. Rehabilitation of the degraded Yaoundé-Bafoussam inter-urban section (228 kilometres); 1.10. Upgrading of the Maroua-Bogo-Maga-Pouss road (93 kilometres); 1.11. Upgrading of the Kribi-Grand Zambi road (55 kilometres); 1.12. Upgrading of 35 kilometres of urban roads in the major cities crossed; 1.13. Construction of infrastructure and weighing and load-control devices between Yaounde and Babadjou; 1.14. Routine and periodic maintenance of the Yaounde-Bafoussam-Babadjou road section over a ten-year period using the Road Maintenance Management Service by Level (GENIS) method; 1.15. Environmental protection and road safety awareness; and 1.16. Works control and supervision.
RELATED WORKS	<ul style="list-style-type: none"> 1.5. Rehabilitation and/or construction of basic socio-economic infrastructure; 1.6. Support for specific activities of women's associations (CPF, multi-purpose platforms, etc.); 1.7. Rehabilitation of rural markets along the road; and 1.8. Control and supervision of related works.
ROAD SECTOR STUDIES AND INSTITUTIONAL SUPPORT	<ul style="list-style-type: none"> 2.1. Technical assistance to build the institutional capacity of the Ministry of Public Works (MINTP) in road project monitoring and coordination; 2.2. Transport sector strategy development; 2.3. Feasibility study on the establishment of a road agency; 2.4. Detailed engineering design of the Bafoussam bypass; and 2.5. Detailed engineering design for widening the northern dual carriageway into Yaounde and the north-south dual carriageway into Bafoussam.
PROJECT MANAGEMENT	<ul style="list-style-type: none"> 4.1 Support for the Project Monitoring and Coordination Unit; 4.2 Socio-economic and environmental impact monitoring and evaluation; 4.3 Project accounting and financial audit; and 4.4 Project technical audit.

Source: NCP (September 2015)

Figure 1 below shows the location of this road section.

Figure 1
Project Location



Source: ESIA Report 2013

6.3 Current State of the Road

The 55-km-long Kribi- Grand Zambi road section is motorable over most of its length, with areas of potential breaks (sloughs and sagging culverts). At the level of Kribi 2 (Dombe) there is a paved urban section of about two kilometres, with shoulders and culverts in places.

6.4 Key Inputs Required

Water: Water is also one of the products that will be consumed in huge quantities during the project implementation. Large volumes of water will be needed, particularly to mix concrete, obtain the optimum compaction of the different layers of materials that make up the road formation, and various clean-ups in project sites. The criteria to guide the selection of water courses from where water will be collected for use on the project site include the flow regime of water courses and the quality of their water. Apart from the seasonal stream in Dombe village, the other water courses of the relevant road section are permanent and therefore collection for construction needs will not pose any problems in terms of water availability. However, impairing the water quality could be a concern.

Fuel: The operation of construction machines and vehicles is heavily dependent on the supply of fuel and lubricants (oils and grease). The accidental spill of these products during their handling may pollute various environments. The same is true for waste resulting from their use (waste oils).

Laterite borrow sites: Borrow sites from which laterite could be collected for the works have been identified. Table 2 below summarizes these sites.

*Table 2
Location of Some Laterite Borrow Sites and their Available Volume*

No.	Pk	Side	Localities	Volume (m ³)
1.	9+000	Right	Dombe	10 824
2.	20+650	Left	Bissiang	12 000
3.	31+300	Left	Bidou 1	7 938
4.	39+500	Right	Makoure	45 864
5.	49+100	Left	Bandévouri	16 215
6.	57+300	Right	Petit-Zambi	10 800

Source: EGIS Cameroon, 2013

Many borrow sites, such as Dombe and Bandevour, were exploited for road maintenance purposes and abandoned without rehabilitation. In the choice of sites to be exploited as part of this project, preference should be given to these sites in order to avoid opening new ones and thus minimize the destruction of fragile ecosystems. The following figures show the sites abandoned without rehabilitation.

Rock quarries: In the project area, there are stone deposits (especially gneiss) on either side of the road. Generally, these are more or less voluminous rock masses. The rocks will serve as quarry for the road construction (aggregate production). The most voluminous rock mass in the project area is located in Grand Zambi (Pk 59.35), with a volume of 40 000 m³.

Sand deposits: Several natural sand deposits have been identified in the project area. The type is fine-grained (maximum diameter = 2 mm) washed rolled sand. The most significant of these deposits is located at PK 31 + 400. Other sand extraction points are located in certain rivers such as the Lokoundje and its tributaries. Their exploitation could generate taxes for municipalities or economic benefits for local residents.

Labour Force: Construction site requirements in terms of the number of people to be mobilized have not yet been estimated. However, it should be noted that labour-intensive (HIMO) works will be prioritized since it is possible to replace machines with human labour, which limits the impact of works on the environment. Most manual tasks, such as clearing and cleaning out of structures, could be sub-contracted to the local residents.

4. DESCRIPTION OF THE PROJECT ENVIRONMENT

Direct impact area: Generally, it is located within a 30 to 40-metre-wide corridor along the layout of the road, the borrow sites (sand, laterite, quarry), the worksites installation and operation sites and the access roads to borrow sites and worksites. It is worth noting that apart from the layout adjustment areas, in asphaltting the Kribi-Grand Zambi road, 80% of the right-of-way of the present earth road will be maintained.

Indirect impact area: It primarily concerns the villages and sub-divisions crossed by the road. These are Dombe, Bikondo and Bilolo villages in Kribi 2 Sub-division, Bissiang, Bandévouri, Bidou 1, Makoure 1 and Makoure 2 villages in Lokoundje Sub-division, and Ndtoua, Petit Zambi and Grand Zambi villages in Bipindi Sub-division. To these should be added the city of Kribi and its surrounding areas.

Cumulative impact area: It consists of several villages namely: (i) Bikondo, located at the intersection between this project and the Kribi-Edea Highway Project; (ii) Bissiang, where HEVECAM and SOCAPALM corporations are located; (iii) Bikondo, Bilolo, Bissiang, Bandevouri, Bidou 1, Makoure 1, Makoure 2, Ndtoua, Petit Zambi and Grand Zambi where CUF UFA and EFFA are located; and (iv) Grand Zambi, where GEO-Stone company is in the process of signing a mining agreement, covering an area of 1 000 km²; (v) the Bissiang-Grand Zambi area, where SINO FOKUS company has an iron exploitation concession covering an area of 500 km²; and (vi) Bikondo, Bidou 1 and Grand Zambi, which is crossed by the COTCO oil pipeline.

4.1 Physical

Climate

Kribi enjoys the southern equatorial coastal climate that prevails on the coastal strip to the south of the Littoral Region and stretches through Campo to the border with Equatorial Guinea (Olivry, 1986). It is a hot and humid climate. The rainfall is abundant on the coast where it reaches 2 947 mm annually, and is spread over about 200 days.

Air Quality

Human activities and the state of the vegetation play an important role in the air quality of an environment. The earth road that currently serves the project area has a relatively low level of road traffic made up of motorcycles, private cars, logging trucks, public transport vehicles or agri-business vehicles belonging to the Cameroon Rubber Corporation (HEVECAM), the Cameroon Oil Palm Corporation (SOCAPALM) and Forest Management Units (FMUs). Other sources of polluting gases are the generators of these corporations, firewood use in households, bush fires, slash-and-burn cultivation, etc.

It is worth noting that the three gases identified as primarily responsible for almost all emissions in Cameroon are: CO₂, CH₄ and N₂O. Table 3 below shows the share of each of these gases emitted in Cameroon in 1994, expressed as giga gramme equivalent CO₂ (GgECO₂).

Table 3
Major Greenhouse Gas Emissions by Sector (in GgECO₂).

Sector	Gas emitted								
	CO ₂	CH ₄	N ₂ O	NO _x	CO	NMVOC	SO ₂	Total	%
Energy	2 216	40.92	0.53	24.42	769.05	98.38	1.15	3239.69	7.36
Industry	387.03	0.00	0.00	0.19	11.77	22.46	1.38	387.03	0.88
Agriculture	0.00	420.38	25.54	110.80	650.28	0.00	0.00	16 435	37.83
Land Use	2 1979	8.94	0.06	2.22	78.19	0.00	0.00	22 186	50.44
Refuse	0.00	60.69	1.47	0.00	0.00	0.00	0.00	1 739.5	3.95
Total	24 583	530.92	27.60	137.62	1509.29	120.84	2.53	43 988	100
%	55.89	25.35	18.77					100	///

Source: EGIS Cameroun, 2013

Relief

The project area is characterized by low relief and relatively flat landforms. The mean altitude of the city of Kribi is about 18 m. The coastal plain as a whole has a mean altitude of less than 300 m. It appears on a wider scale as a softly undulating expanse made up of low and gently sloping hills.

Hydrology

The hydrographical network of the project area is dense. Generally, the tributaries of the Kienké and especially the Lokoundjé are the main water courses of the area crossed by the project. These water courses are part of the Atlantic basin. The physico-chemical analyses of the water sample collected from the Lokoundjé during low-flow periods show that the water is fit for use in concrete-making. The aggressiveness of the water towards hardened concrete is described as “light”. This aggressiveness rate would pose no significant problems in terms of the durability of hardened concrete.

Topography and Pedology

With regard to pedology, the area has ferrallitic soils, which justifies the opening of numerous laterite borrow sites near the road for maintenance purposes. The swampy valleys are characterized by hydromorphic soils (Yongue Fouateu, 1986), most often forming strips along water courses, especially along the Lokoundjé and its tributaries. The area around Kribi is characterized by topomorphic yellow ferrallitic soils that are highly clayey and generally deep. They are well drained and very permeable.

4.2 Biological Environment

Plant Life

The road Kribi-Grand Zambi road section is located in the moist evergreen forest area. However, the natural vegetation has been severely degraded by human activities. That is why there is a total absence of primary forests in the 30-metre right-of-way assessed. It is observed that large swaths of the area are either occupied by crops and houses or left fallow. Cultivated areas account for nearly 88% of the right-of-way. Land use along this road comprises the following types: mixed crop farms (29.5%), short fallows (24.8%), medium-term fallows (15.5 %), long fallows (11.7%), cocoa farms (6.7%), secondary forests (8.9%) and swamp forests (2.4%). The main species are shown in Table 4 below.

Table 4
The Main Tree Species of the Project Area

COMMON NAMES	SCIENTIFIC NAMES	USE
Iroko	<i>Milicia exceisa</i>	Pharmacopoeia, Firewood
Frake	<i>Terminalia superba</i>	Timber, Pharmacopoeia
Sapelli	<i>Entandrophragma cylindricum</i>	Carpentry Pharmacopoeia
Bilinga	<i>Nauclea diderrichi</i>	Lumber, Pharmacopoeia
Ebénier	<i>Diopyros crassiflora</i>	Lumber
Doussié blanc	<i>Afzelia pachyloba</i>	Lumber
Ayous	<i>Triplohyton sceroxylon</i>	Lumber
Moabi	<i>Baillonella toxisperma</i>	Pharmacopoeia, Lumber
Kosipo	<i>Entandrophragma candoli</i>	Lumber
Sipo	<i>Entandrophragma utile</i>	Pharmacopoeia
Framiré	<i>Terminalia ivorensis</i>	Lumber
Eyong	<i>Sterculia Oblonga</i>	Lumber
Movingui	<i>Disthemonanthus bentamianus</i>	Pharmacopoeia, Lumber

Source: Field survey (CARFAD, 2016)

Wildlife

The decline in vegetation density has significantly reduced wildlife habitat. Large animals have gradually disappeared from riparian forests, not only as a result of the shrinking of its habitat, but also because of hunting intensity and poaching. Nevertheless, the project's direct impact area is home to a fairly wide variety of wildlife.

The gazelle (gazelle rufufrons) is the only species deemed vulnerable in the project area. No species in the area is listed as endangered or critically endangered. Table 5 below shows the list of the main species classified in protection Class A (rare species which are not allowed to be hunted).

Table 5
List of Class A Major Wildlife Species in the Project Area

COMMON NAMES	SCIENTIFIC NAMES	PROTECTION CLASS
Mammals		
Water chevrotain	<i>Hyemoshus aquaticus</i>	A
Sitatunga	<i>Tragelaphus spékei</i>	A
Buffalo	<i>Syncerus caffer</i>	A
Gazelle anomalure	<i>Gazelle rufufrons</i>	A
Beecroft	<i>Anomalurus beecrofti</i>	A
Birds		
Francolins	<i>Francolinus spp</i>	A
Green parrot	<i>Poicephalus crassus</i>	A
Red parrot	<i>Poicephalus gahem</i>	A

Source: Adapted from the ESIA

Protected Area

The Campo-Ma'an National Park remains the largest biodiversity protection area in Ocean Division. It is located at about 50 km as the crow flies from the project.

4.3 Human Environment

4.3.1 Demography

The Kribi-Grand Zambé road is located in the South Region of Cameroon - an area with a population estimated at 373 798 inhabitants in 1987 and a surface area of 47 191 km² (RGPH, 1987). The population situation of the project area is presented in Table 5 below. The villages of the project impact area comprise the following ethnic groups: the Mabis, the Fangs, and the Ngoumbas - all of which are linked by subtle mixes of kinships, lineages and clans.

Table 6
Gender Distribution of the Population of the South Region and the Sub-divisions Concerned in 2005.

Administrative Unit	Total Population	Gender	
		Male	Female
South Region	634 655	321 343	313 312
Ocean Division	179 093	90 198	88 895
Bipindi Sub-Division	14 118	6 869	7 249
Lokoundjé Sub-Division	10 225	6 025	4 200
Kribi Sub-Division	93 246	47 057	46 189

Source: BUCREP, 2010

The villages close to Kribi are cosmopolitan in nature. In Bilolo and Bokondo, there is a small but certainly effective presence of Bamilekes, people from the English-speaking part of the country, Peuls, commonly called “Hausas”, and Bamouns. There are also pygmies, believed to be first inhabitants of Cameroon's forest region, most of whom live in settlements in the heart of the forest. These settlements are tiny villages located between 2 and 15 kilometres from the highway. The census carried out during the assessment indicate the presence of 5 families along the Kribi-Grand Zambi road.

4.3.2 Organization and Management of Local Affairs

The organization of Bantu communities (Fangs, Mabis, Ngoumbas, Bulus, etc.) along the project area is about the same. In these communities, the village chief manages the community in agreement with the council of elders. Clan chiefs officiate during traditional rites and the burial of patriarchs. The power devolution system is hereditary and patriarchal, that is to say, power is handed down from father to son. In some other cases, the ruling family may appoint a successor who is not directly related to the nuclear family of the deceased chief. The case of Dombè is exceptional. In this village, a woman took over from the late chief and is currently heading this community on the outskirts of the city of Kribi.

Along the project route, there are all types of houses: very high standing, high and medium standing houses, as well as houses in semi-durable material, mud and plank.

4.3.3 Customs and Tradition

The inhabitants of the villages crossed are characterized by the customs and traditions of their respective ethnic groups. In this regard, worthy of mention are the dances and festivals. As for the dances, there are a wide variety. Among the Mabis, the dances include "Mariengual", "Ranchel", "Mbala", "Bide", "Mbol", "Chouala Biang"; "Mbouang Bokari" and "Boubougli" - all of which are staged during festivities or official ceremonies.

4.3.4 Sacred Sites

The villages have many sites deemed sacred. At Bandevouri, the residents indicated the existence of a former pygmy settlement, with a cemetery supposedly located within the road's right-of-way. At Bilolo, the village chief reported the presence of five sacred sites. At Bikondo, two sacred sites were reported, but not located within the right-of-way, namely: the site known as Ngouang Molobi, meaning catfish grotto, and the one known as Boung Mayanga (or Pineapple Bays). At Bidou 1, there is a place of devotion run by the Catholic Mission known as “Cross Mountain”, where the people go to pray. In Makouré 1, there is a cemetery opposite the stadium. In Ndtoua, the Nkol Basili and Nkol Bamla sacred sites were identified, located respectively at 1 km and 25 km from the village, while in Petit Zambi the "*Koueguigamour*" site was reported.

4.3.5 Socio-Economic Activities

4.3.5.1 Agriculture

The predominant activity in the villages is the farming of food crops (maize, cocoyams, sweet potatoes, cassava, plantains, etc.). Also noticeable is the presence of oil palm and cocoa

plantations. Throughout the area, forests are disappearing. There is little or no use of fertilizers by peasant farmers. However, industrial agriculture makes abundant use of fertilizers. Bissiang village has a community rubber plantation, but it seems to have ceased operating for lack of maintenance. Crop yields depend on farming practices and the soil. However, it is estimated that village cocoa plantations produce between 2 to 3 t/ha. For palm oil, the output ranges from 4 to 5 tonnes. Agriculture is not, however, without its share of problems. These include: (i) lack of resources for the running of supervisory institutions; and (ii) inaccessibility of production areas.

4.3.5.2 Stockbreeding

Intensive stockbreeding is practised on the outskirts of the city of Kribi, involving pigs and chicken. The difficulties associated with this type of stockbreeding concern the seasonal diseases which often decimate entire stocks. In villages, traditional breeding is predominant, focused much more on sheep, goats and chickens. The animals thus raised are consumed for protein, sold on local markets and used to resolve certain family issues (dowry, marriage and various ceremonies).

4.3.5.3 Other Activities

Different types of fishing are practised in villages along the project route, such as angling, dam fishing and net fishing. Fish can be found in virtually all water courses, rivers, streams, even ponds. There are all varieties of carp, tilapia, bullheads, catfish, etc. Shrimp and crab fishing is more fruitful in River Kienkié which runs through many villages. This type of fishing is mostly reserved for women.

Hunting is practised in all villages of the project area. The hunting types are: dog-assisted hunting, trapping and gun hunting. Various types of game are caught, namely: rats, hedgehogs, hares, wild boars, antelopes, deer, gazelles, pangolins, etc.

Handicraft activity involves the manufacture of basket traps, pestles and mortars, as well as canoes. In the past, craftsmen specialized in supplying the village with essential tools, and handicraft also included the manufacture of musical instruments such as the "Mvêt", balafons or xylophones.

4.3.8 Access to Basic Infrastructure and Services

- **Drinking Water:** Access to drinking water is extremely difficult in the project area. For drinking, the people rely on water from rivers, streams and even puddles. The various streams are used for bathing, laundry, dishwashing, etc. Hence the high prevalence of water-borne diseases (typhoid, amoebiasis, diarrhoea, etc.) - the leading cause of morbidity.
- **Electricity:** Along the project route, the electrified area begins from Kribi and ends at Bissiang, presenting a distance of about 15 km. The remaining villages up to Grand Zambi are plunged in darkness. In non-electrified areas, residents use hurricane lamps for lighting. Such a situation is not likely to facilitate schooling as well as income-generating activities, given that the latter often involve the use of small electrical equipment. Lack of electricity is one of the fundamental causes of the surge in rural-to-urban migration. Regarding energy for cooking, more than 90% of the households surveyed use firewood;

- **Education:** Every village has at least one school. There are no less than 18 schools along the route, including: public, private, secular and religious, nursery and primary schools, as well as colleges and high schools. Except in Dombè, most schools on the route, have critical needs. The number of classrooms is often inadequate for full-cycle primary schools (grades one to six);
- **Health:** From Kribi to Grand Zambé, three health facilities were identified, namely a healthcare practice in Dombè, the Bandevouri Integrated Health Centre and the Grand Zambé Integrated Health Centre. This means that there is a severe dearth of health facilities throughout the route. The Dombè healthcare practice is a private facility that consults and provides care only to well-to-do customers. Yet, the project crosses the forest zone of Cameroon where there are such prevalent diseases as malaria, schistosomiasis, onchocerciasis, etc., compounded by STIs and HIV/AIDS, water-borne diseases and skin infections. Common diseases mentioned by local residents and health workers are malaria, cholera, river blindness, asthma, diarrhoea, amoebiasis, respiratory and lung infections, and filariasis.

5. ANALYSIS OF ALTERNATIVE SOLUTIONS

The technical baseline study analysed different scenarios from the economic, environmental and social standpoints to determine the best possible alternatives.

Opting to not implement the project (no-project alternative) would be tantamount to “forgetting” or leaving this major Cameroonian and sub-regional road in an advanced state of degradation. Thus, to achieve the objectives assigned to the project by the national authorities and address the problems it aims to resolve, the “no-project” scenario is not to be recommended insofar as it runs counter to the economic and social development policies highlighted by Government.

Based on technical, economic, environmental and social criteria, it was decided that the project road should closely follow the existing route, except in accident-prone areas requiring adjustments or where sacred sites need to be avoided. Thus, 80% of the current route of the road will be maintained to minimize expropriations.

6. POTENTIAL IMPACTS AND MITIGATION AND ENHANCEMENT MEASURES

6.1 Direct Negative Impacts

6.1.1 *Worksite Preparation and Construction Works Phase*

6.1.1.1 *Biophysical Environment*

- **Impact on air quality:** The clearing and earthworks, pavement construction and movement of vehicles on the road under construction will generate dust, gaseous emissions, including carbon oxide (CO_x), nitrogen oxide (NO_x) and sulfur oxide (SO_x) and aerosols, leading to increased concentration of greenhouse gases in the atmosphere. The operation of concrete batching, crushing and asphalt plants produces dust, while the mixing plant produces fumes that may contain volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) which

could endanger the health of workers and local residents. Air pollution may also: (i) reduce visibility for drivers and cause accidents; and (ii) increase cases of respiratory and eye infections affecting exposed workers and residents;

- **Impact on soil structure** (compaction, erosion, and loss of soil fertility): Bare soil could be seriously affected by surface erosion if nothing is done, since it has little organic matter and plant cover to slow down surface water run-off. Furthermore, the movement of construction machinery will contribute to soil compaction resulting in soil sealing and loss of fertility, particularly in and around deviation areas and access roads to quarries and borrow pits.
- **Risk of physical and chemical pollution of water and soil:** During the works, dangerous products such as hydrocarbons, lubricants and waste oils may be accidentally or intentionally spilled on the ground. These products may be carried by water seeping into deeper soil layers and thus become a source of groundwater pollution. Moreover, some construction materials (concrete, lime, asphalt, etc.) could come into contact with seepage water and thus be carried into and pollute the groundwater table. The impact on the people's health may also be significant, given the scarcity of drinking water points in the villages. The absence of a petrol station along much of the project route will compel the company to stock up fuel for the operation of its fleet of vehicles and equipment pool. In the worksite, grease and engine oils, bitumen for road surfacing and concrete release agents will be used, as well as paints for marking road signs and a variety of other uses.
- **Impact water quantity:** Water is available in this region, but the local residents use some of the water courses for various purposes, including drinking water. The works will entail pollution risks which could exacerbate the current problems. Also, the laying of the foundations of piers and abutments or scuppers on the beds of water courses may require diversion of the latter in order to drain the work areas. The flow regime of water courses will thus be disrupted, initially upstream where flooding could occur if a dyke is built, and/or downstream following the reduced water flows;
- **Impact on wildlife:** Wildlife will be disturbed by the construction site as the noise of equipment, the presence of labourers, especially construction machinery, will affect the tranquillity of animals. Also, road rehabilitation site workers will certainly indulge in the consumption of game which is generally cherished by people from outside the area;
- **Impact on plant life:** In developing the road, constructing the fixed site installations and developing access roads to the borrow areas and quarries to be exploited, the project will result in the destruction of vegetation cover, including secondary forests and long fallows, as well as the fruit trees and shade trees along the project route. This impact will be more pronounced in route rectification areas, quarry sites and technical base installation sites. The total vegetation cover that will be lost as a result of the project implementation is estimated at 121 ha.

6.1.1.2 Human Environment

- **Expropriation:** The road construction project will lead to the displacement of an estimated of 414 people. The development will affect homes, agricultural land,

graves, etc., located mainly in the communes of Kribi II, Lokoundjé and Bipindi (see summary of the Resettlement Plan in Annex for more details).

- **Impact on the health of workers and the local residents:** The arrival in the project area of workers from various places will probably increase the prevalence rate of sexually transmitted infections (STIs) and HIV/AIDS. The works organization could generate a number of health risks for workers using noisy machinery (hearing disorders leading to progressive deafness) and gas-emitting machinery (respiratory problems). Workers may be involved in accidents when travelling between their place of residence and place of work. The various types of solid and liquid wastes generated on worksites and in workers' camps could affect the quality of life of local residents by polluting drinking water resources.
- **Risk of conflict:** Many types of conflicts may occur, especially between the project and the local residents, between the employer and employees, etc. These conflicts could stem from several factors, namely: (i) non-compliance with the customs and traditions in their new living environment; (ii) absence of communication and awareness campaigns; (iii) non-compliance with the compensation procedures for damaged property and failure to consult the people living along the road prior to expropriation and deviation-opening procedures; and (iv) non-compliance with employment conditions between employees and the project manager, etc.

6.1.3 Operation Phase

6.1.2.1 Biophysical Environment

- **Impacts on wildlife:** The road development will facilitate the mobility of various users, including poachers and illegal loggers. As a result of the likely increase in traffic and easier market access, demand for poaching products will increase the pressure on wildlife resources. The impact will be cumulative with that of all the other projects being implemented in the Kribi area.
- **Impacts on plant life:** The risk of increased illegal logging is a negative impact of indirect interaction. Its importance is average because local neighbouring forests have been granted the status of Forest Development Units (UFAs) and the beneficiaries of these UFAs are responsible for supervising them on a permanent basis.
- **Impact on Drinking Water Resources and Soil:** The wear of road surfacing resulting from friction caused by continuous traffic flow produces a large quantity of very fine dust. For 7.5 m-wide roads, the pollution charge is estimated at 0.66 kg/m². The biological oxygen demand (BOD) measured after five days (BOD₅) of this wear is generally minimal, while the chemical oxygen demand (COD) is quite high in areas of heavy traffic. Although, so far, there are no reliable long-term values showing how gas-emissions by vehicles contribute to polluting rainwater effluents in urban areas and along the roads, this risk exists. Wear resulting from friction between brake linings and metal components mostly generate inorganic matter containing quite substantial quantities of heavy metal such as copper, nickel, chrome and lead. Furthermore, poorly managed or eliminated solid wastes will have potential impacts on these resources.
- **Impact on air:** See section on climate change.

6.1.2.2 Human Environment

- **Risk of Road Accidents:** At the end of works, traffic will be free-flowing on the road and the movement of people and goods will intensify. Moreover, the project area produces abundant agricultural products, which may cause high traffic of heavy duty and liaison vehicles. The intensification of traffic may be a factor in the recurrence of road accidents.
- **Human Health Risk:** Given the practice of drying foodstuffs on road shoulders and considering the potential impacts on water resources and the soil described above, consumers of such foodstuffs are exposed to health risks in the long run.

6.2 Positive Direct Impacts

The positive impacts of this road are self-evident. The main positive impacts of the project may, however, be summarized as follows: (i) improved transport conditions for people and goods; (ii) opening up of the hinterland and improved access to basic socio-economic infrastructure through the construction of access roads, slip roads, etc.; (iii) creation of 1 500 direct and indirect jobs during the road construction, operation and maintenance phases; (iv) improved living conditions for people served by the road and related feeder roads, as well as the ancillary developments; (v) reduction of erosion through the rehabilitation of some engineering structures; (vi) improved safety around a number of schools located along the road.

6.3 Maintenance Activity-Related Impacts

Maintenance works will be carried out using GENIS method and will create jobs, albeit fewer compared to the construction phase.

6.4 Cumulative Impacts

6.4.1 Negative Impacts

It is quite likely that the impacts of these projects will have cumulative effects, evidenced by the fragmentation and disruption of natural ecosystems and by improved living conditions and business opportunities for the local people. Indeed, the needs in terms of staff accommodation, supply and purchase of equipment, and the quest for employment are generating an increasingly huge and steady human flow towards the South Region. Thus, the protected areas of Kienké-South Forest Reserve, the Campo Ma-an National Park, etc., will be subject to greater human pressure. The current methods of exploiting plant, forest and wildlife resources will be intensified. Thus, the dwindling chimpanzee and gorilla population will be amplified by illegal hunting and poaching.

6.4.2 Positive Impacts

The road and the ancillary developments will enhance the socio-economic development of the area and activities that depend on them. Operators and entrepreneurs will infuse fresh impetus into and strengthen production activities (agriculture, stockbreeding, etc.), trade, etc.

6.5 Mitigation/Enhancement and Advanced Monitoring Measures at this Phase

6.5.1 Regulatory and Administrative Measures

The measures seek to ensure project compliance with applicable regulations, as well as administrative and contractual requirements, in particular:

- ***Compliance with environmental and social regulations:*** The project should ensure compliance with national environmental regulations in force and those of AfDB in the construction and operation phases. To that end, the report on the ESIA conducted in 2013 was approved by MINEPDED and the compliance certificate was issued on 22 October 2014. The updating of the ESIA report does not alter the validity of the said certificate which runs until 22 October 2017.
- ***Compliance with land tenure regulations:*** Given that the project requires expropriation, the resettlement plan must comply with the land tenure regulations in force in Cameroon. ***These elements are contained in the Abbreviated Resettlement Plan (ARP) prepared as a separate document.***
- ***Selection and recruitment of contractors:*** Environmental and social clauses will be included in the bidding documents (BDs). The environmental aspect of the site internal rules and regulations will also be prepared to incorporate environmental considerations in the practices of the contractor and behaviour of the employees (consumption of game, consumption of alcohol during working hours, noncompliance with hygiene rules, etc.). The contractor is required to recruit an Environmental Officer.
- ***Establishment of a Work Hygiene, Safety and Environment Committee:*** Its role will be to ensure hygiene, safety and environmental protection at workplaces. It will also raise environmental awareness among employees and ensure that they are involved in the implementation of environmental measures.
- ***Fair, equitable and prior compensation*** of project affected persons for property identified in the Comprehensive Resettlement Plan (CRP). The budget covering all the measures adopted under this Plan, including the costs of the implementation, monitoring and evaluation of the operation, amounts to CFAF 625 038 387. This amount will be paid by the Government of Cameroon prior to the start-up of works on the lot concerned.
- ***Contractor's commitments and deliverables:*** The contractor responsible for works will prepare a quality assurance plan (QAP) including environmental protection clauses with which the contractor undertakes to comply. It will be recommended that each contractor for each lot should submit a site environmental protection plan (SEPP) and a site environment management plan (SEMP) for approval by the environmental expert of the control firm 60 days after notification of the contract. These documents should at least contain: (i) the organization chart of the staff assigned for environmental and social management, with an indication of the project environmental and social officer; (ii) the description of the methods for reducing impacts on the biophysical and socio-economic environment; (iii) the plan for managing and restoring borrow areas and quarries, including management of explosives; (iv) the water resources management plan; (v) the erosion, drainage and sedimentation management plan; (v) the workers' camp establishment plan showing areas for storing and parking equipment; (vi) the solid and liquid waste management plan; (vii) all the site protection measures and the implementation programme; (viii) the location and general site plan drawn to scale; (vii) the description of methods for preventing and reducing pollution, unwanted fires, road accidents, etc.; (viii) health infrastructure and access by the population in case of emergency; (ix) site regulations on environmental protection and safety;

(x) the provisional plan for site development upon works completion and handing over of any borehole facilities to the local population.

6.5.2 Construction Phase

6.5.2.1 Biophysical Environment

- **Air quality protection measures:** The contractor will be required to take all appropriate measures to avoid soiling site surroundings, roadways, shoulders and sidewalks with dust, excavated soil, sludge and materials from works. The company's Site Environmental Protection Plan (SEPP) contains all these measures, and will be approved by the control firm and MINTP prior to start-up of works and will be monitored by them during works. Air, which is the affected component, is dealt with by Section 21 of Law No. 96/12 of 5 August 1996 relating to the Framework Law on Environmental Management and its implementation Decree No. 2011/2582/PM of 23 August 2011 defining the conditions for protecting the atmosphere.
- **Water resource and soil protection:** Surface water and water tables as well as the soil will be protected against pollution mainly by prohibiting of the spillage or discharge of waste water, sludge, molten metal, hydrocarbons and all types of pollutants into wells, boreholes, water tables, streams, brooks, ditches or on the ground. Also, workers' camps will be provided with appropriate equipment (septic tanks, appropriate fuel pumps, etc.). To mitigate the impact on water courses, the following measures should be applied: (i) develop a waste management protocol; (ii) avoid the release of materials (remains of concrete, rubble, scrap metal, etc.) and waste into water courses; (iii) restore the flow of water courses (at the end of the works); (iv) protect the embankment through grassing or concrete revetment; (v) open up waste material disposal areas at a distance of 50 m; (vi) build a concrete area for washing vehicles and machinery with a hydrocarbon separator; (vii) build a covered and leak-proof tank for storage of hydrocarbons; (viii) put at the site lidded bins, labelled according to the different types of waste; (ix) sign a contract for the recovery and treatment of hydrocarbon waste, filters, irons, batteries and other non-biodegradable waste with a company in possession of an environmental license.
- **Measures for limiting impact on plant life:** To mitigate the impacts of extraction sites on the landscape, it will be necessary to: (i) select invisible attack points of the road, gradually clear the site as operation progresses; and (ii) limit and orientate operation in order to achieve a "hollow tooth" operation, develop quarry surroundings (site entrance, access road, etc.) with topsoil and plants. To limit the destruction of the existing vegetation, the Company's terms of reference shall: (i) limit tree felling on the various construction sites to the bare minimum; (ii) make the felled timber available to local residents for firewood so as to limit the pressure on wood resources; (iii) rehabilitate degraded areas (project sites/workers' camp, borrow sites, quarries and others) at the end of the works; (iv) rehabilitate the degraded areas by reforesting mangrove areas. The Project Owner will have to fund a reforestation programme which should be included in the project to offset the project's impact on vegetation. The working assumption might be that for every tree felled, three trees will be planted in replacement. The area to be reforested would then be 121 ha deforested X 3, or 363 ha. The pressure on land in the project area made it impossible to find spaces to plant the compensatory trees. The Technical Coordinator of the Mangroves Programme implemented with the support of the United Nations Food and Agriculture Organisation (FAO)/Programme Management Unit, indicated, during the discussions, the areas and locations of the mangroves to be restored, totalling 330 ha and broken down as follows: (Lokoundjé (60 ha), Mpolongwe (60 ha), Bwandjo (60 ha), Lolabé

(40 ha), Eboundja 2 (10 ha), Eboundja 1 (5 ha), Londji (5 ha), Mpalla (5 ha), Nziou (5 ha), Mahalé (5 ha), Mabiogo (5 ha), Ebodjé (5 ha), Nlendie-Dibé (1 ha), Mboamanga (1 ha), Elabe (1 ha) Mbenji (1 ha)). The Mayor of Kribi 2 underscored the need to plant trees in the city of Kribi. The remaining reforestation to be carried out will address that need.

To mitigate the intensified poaching, the following measures were recommended: (i) incorporate into worksite internal regulations prohibition against the eating or transport of game by site personnel and penalties for offenders; (ii) educate staff and local residents on wildlife protection; (iii) prohibit the sale of bush meat to food vendors at the worksite.

6.5.2.2 Human Environment

- **Compensation:** Monitoring the implementation of the PCR and functioning of the Disputes Settlement Committee. Given that submission of evidence of payment of compensation is a condition precedent to works start-up, it is important to ensure the optimal implementation of the PCR.
- **Access for the local population and durability of the road:** Develop permanent access for residents to buildings on the ridges or at the foot of embankments, and ramps/secondary roads.
- **Awareness-raising on road safety and environmental protection:** An NGO or other specialized entities will be responsible for carrying out this activity, preferably one month before works start-up, during the entire construction period, and one month after the end of construction works. It will sensitize the local population, employees and road users on: (i) health problems (STI/HIV-AIDS, malaria, dangers of drying foodstuffs on the road and use of drying trays); (ii) road safety and road protection; and (iii) environmental protection.
- **Human safety measures:** To ensure the safety of workers, the local population and road users, the contractor is required to take appropriate measures to prevent any risk of accidents: road accidents, unwanted fires, explosions, wrong handling of site equipment, etc. All recommendations on human safety during the works focus on signposting, access control, sensitization, prevention of unwanted fires, and related facilities. To that end, a sensitization campaign will be organized by a specialized NGO (see above).
- **Cultural heritage protection measures:** Apart from graves, no cultural property or site will be directly affected. The route was adjusted to avoid these sacred sites. This notwithstanding and in addition to the proposed mitigation measures, the environmental and social clauses will concern the accidental discovery procedure, in accordance with the laws and regulations governing cultural property and antiques in Cameroon. Archaeological monitoring will also be conducted during excavation works (road and workers' camp/worksite). Lastly, a protocol on the site will be prepared and distributed relating to the harvesting of archaeological samples or remains.

6.5.3 Road Operation Phase

- **Road safety measures:** Town and village crossings, which are dangerous areas for road users and the local population, will be developed with great care (road signs, speed brakes, 2 m-wide sidewalks, widening of shoulders, parking lanes in all villages, protection of entrances to schools, etc.).
- **Measures for protecting the health of the population:** The establishment of drying areas, as well as the construction and equipping of agricultural product processing units (UTA), will help to mitigate the effects of emissions and limit the use of road shoulders for drying foodstuffs. The construction of parking lanes/rehabilitation of markets will help to: (i) prevent overcrowding of markets on market days; and (ii) reduce road accidents at market places. The construction of walls to protect students and pupils will help to: (i) keep students and pupils within school premises and away from the road during break; (ii) mitigate the impact of noise; (iii) reduce the impact of vehicles which could accidentally skid off the road where there are schools.

7. RESIDUAL IMPACTS AND ENVIRONMENTAL RISK MANAGEMENT

7.1 *Negative Residual Impacts*

No moderate or highly negative residual impact is expected after implementation of the mitigation measures. Negative residual impacts will be minor, and will not require any special measures.

7.2 *Negative Residual Impacts*

The environmental risk will be mostly related to the accidental spill of hydrocarbons, bituminous products, explosives and other road construction substances. Measures will concern: sensitization and training of site workers and occasional teams in rapid intervention techniques in case of disaster, security measures to be observed in dangerous or risky areas, and sensitization of the local population on health risk prevention and road safety. All these measures will be described in detail in the documents to be submitted by the contractor and approved by the control firm before works start-up; the measures are: (i) the waste management plan; (ii) all site protection measures and implementation programme; (iii) the methods of preventing and reducing pollution, unwanted fires and road accidents; (iv) health infrastructure and access by the population in case of emergency; and (v) site regulations on environmental protection and safety.

The operation of concrete batching, crushing and asphalt plants produces dust, while the mixing plant produces fumes that may contain volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) which could endanger the health of workers and local residents. To this end, the different authorizations should be obtained to ensure compliance with the various standards. These include, in particular, the conduct of a hazard assessment required by the Ministry of Mines, Industry and Technological Development (MINIMIDT).

8. MONITORING PROGRAMME AND INSTITUTIONAL RESPONSIBILITIES

8.3 *Surveillance Objectives and Content*

Environmental surveillance seeks to ensure effective implementation of environmental measures. Its main objectives are to: (i) ensure compliance with the laws, regulations and strategies in force within the services involved; (ii) comply with Government guidelines on the orientations in the environmental and social impact assessment report; (iii) present an environmental assessment in the event of impacts not provided for in the ESIA and propose appropriate solutions; (iv) help the promoter to react promptly to the shortcomings of proposed mitigation measures or any other unforeseen disruption of the environment; (v) apply sanctions and penalties as stipulated in the various contracts between the promoter and third parties.

To ensure proper project environmental surveillance, the phases to be followed are: (i) preparation of the surveillance programme; (ii) definition of operations to be controlled; (iii) identification and location of sites to be controlled; (iv) inventory and understanding of the environmental measures proposed in the Environmental and Social Impact Assessment (ESIA) report.

8.2 Operations Requiring Surveillance

On the whole, the operations which will require environmental surveillance include:

- compliance with site environmental regulations;
- presence of mobile and/or fixed road signs at entrances to sensitive places (workplaces and built-up areas, etc.);
- control of the management of storage areas for waste materials (sewage products, spoil earth, etc.);
- operation and restoration of borrow sites, as well as site facilities;
- compliance with STI/AIDS prevention measures;
- payment of compensation for damaged property and crops;
- wearing of appropriate personal protection equipment by staff;
- collection of waste oils as well as all other dangerous wastes.

8.3 Surveillance and Monitoring Actors

Contractor's Environmental Officer: The contractor's Environmental Officer will be responsible for implementing certain measures. However, the officer will be the key environmental surveillance actor. In fact, although the environmental officers of contractors will ensure the implementation of certain measures, they will also be the key surveillance actors of the implementation of many other measures which will be generally implemented by the site foremen and garage managers.

Control Mission Environmental Officer: Control mission environmental officers will be the main environmental surveillance agents. Their role will be to ensure smooth implementation of

the environmental measures. To succeed, they must work in close collaboration with their counterparts in works implementation enterprises.

MINTP's Infrastructure Environment Protection Unit (CPEI): The CPEI will supervise environmental surveillance through monthly field trips and/or monthly meetings chaired by the Head of the Procurement Service. It will also be responsible for receiving and reviewing half-yearly reports prepared by the Control Mission before they are forwarded to the Ministry of Environment, Nature Protection and Sustainable Development (MINEPDED), in accordance with the regulations in force.

During the Bank preparation mission, MINEPDED recommended that an Environmentalist in the Central Services, that is MINEPDED's ESMP Monitoring Sub-department, should be designated to monitor the implementation of the project ESMP, given that the project concerns two regions of Cameroon. Notwithstanding monitoring at the central level, the Divisional Delegations of MINEPDED and of the Ministry of Forestry and Wildlife (MINFOF), whose powers cover the areas of forestry, wildlife and nature conservation will be involved in monitoring, in accordance with Decree No. 2013/171/PM of 14 February 2013. At the practical level, a monitoring committee comprising representatives of the main Ministries, alongside representatives of other services depending on the issues to be discussed, has been established.

Local Population: The role of the population living along the road in environmental surveillance will be to see to it that the environmental measures are properly implemented. To ensure that the project activities do not degrade their living environment, the local population should participate in environmental surveillance. To that end, they should know their rights and duties, and all the environmental guidelines to be observed in order to avoid making unfounded claims that may be the source of conflicts. They should, as much as possible, denounce any failure to comply with the proposed measures not properly implemented.

8.3 Surveillance Tools

To succeed in their surveillance missions, the control mission environmental officers will design appropriate environmental surveillance tools, including:

- environmental identification form (FIE);
- indicator form;
- environmental logbook;
- preventive action form;
- reports of sensitization meetings;
- environmental non-compliance form;
- correspondence.

8.4 Reports

Quarterly environmental and social surveillance reports will be prepared by the control mission environmental officers. The reports should summarize their activities and the difficulties encountered, and be submitted to AfDB.

Half-yearly reports should be submitted to MINEPDED (Article 27(3) of Decree No. 2013/171/PM of 14 February 2013 laying down conditions for conducting environmental and social impact assessments). Following the opinion of the Inter-ministerial Committee on the Environment, MINEPDED may adopt remedial or additional measures to reflect impacts not initially or insufficiently assessed in the ESIA.

9. PUBLIC CONSULTATIONS AND INFORMATION DISSEMINATION

Public consultation in Cameroon is governed by Article 11 of Decree No. 2005/577/PM of 25 February 2005. Accordingly, the stakeholders concerned were consulted during the conduct of the ESIA in 2012 and during its update.

9.1 *Public Consultation in 2013*

It is worth noting that public consultations were also conducted as part of the Environmental and Social Impact Assessment and validated by the Ministry of the Environment. Public hearings relating to this assessment were held from 26 to 31 August 2013, in Ngomedzap, Mvengué, Lolodorf, Bipindi and Kribi 2 Town Councils.

9.2 *Public Consultation in 2015 and 2016*

Ten public consultation meetings were held with the people along the project route, and with the entire population, as well as with the project-affected persons. Of the ten meetings held, five involved all residents of villages along the project route. These meetings were held from 26 to 27 January 2016 in Bilolo, Bissiang, Bidou 1, Ndtoua and Grand Zambi. They were attended by Sub-Divisional Officers, village heads, elders, residents, the assessment team consisting of MINTP and CARFAD staff.

The various meetings were attended by Divisional Officers, Sub-Divisional Officers, village chiefs, residents, and the assessment team consisting of MINTP and CARFAD staff. The minutes of these consultations are annexed to the ESIA reports.

9.3 *Public Consultations with Project-affected Persons (PAPs)*

The other five public consultation meetings brought together project-affected persons (PAPs). They were held from 3 to 4 February 2016 in Dombe, Bilolo, Bidou 1, Ndtoua and Grand Zambi. Apart from the assessment team members (MINTP and CARFAD), these meetings were attended by Sub-divisional Officers Kribi 2, Lokoundjé and Bipindi respectively, village chiefs, elders and project-affected persons.

The purpose of these public consultations with PAPs was to: (i) recall of the regulatory context of the public consultations conducted as part of the ESIA preparation effort; (ii) present the legislative and regulatory framework for involuntary displacements or expropriations; (iii) discuss the expropriation procedures/proposed solution/compensation package.

9.4 *Outcomes of ESIA-Related Public Consultations*

Concerns were raised by participants relating to such issues as: (i) the sustainability of the road; (ii) compensation; (iii) lack of drinking water for residents of the area; (iv) inadequacy and poor state of health and education infrastructure; (v) difficulty of evacuating agricultural products due to the inaccessibility of agricultural production areas; (vi) the poor state of rural roads; (vii) lack of local marketing infrastructure; and (viii) youth unemployment.

Many of these concerns and expectations will be reflected in the design of the road and related facilities/measures that will be developed by the programme. In addition to the road, these will include: (i) the upgrading of 5 km of urban roads in major cities crossed by the project; (ii) the construction of a market; (iii) the provision of 10 equipped boreholes; (iv) the construction and

equipment of a multi-purpose centre for the advancement of women and young people and the supply to women's groups of equipment kits for the processing of agricultural products.

9.5 *Outcomes of Public Consultations with PAPs*

Overall, the main concerns of PAPs relate to compensation for the property that will be destroyed and support in connection with compensation procedures. In more detailed terms, it should be noted that: (i) compensation must be solely in monetary form, but at least be equivalent to the beneficiary's previous standard; (ii) tombs, whether built or not, should be included in the developments requiring compensation; (iii) sacred sites in the Dombè chiefdom, including churches, should be identified in collaboration with local traditional authorities, compensated for and moved if necessary; (iv) an accurate and objective inventory of all rightful claimants should be made to avoid conflicts and misunderstandings; (v) PAPs should be informed in a timely manner of expropriation operations; (vi) all boreholes destroyed should be completely rebuilt.

Further explanations have been provided on the procedure of expropriation for public purposes and compensation conditions. It has been explained that expropriation for public purposes and compensation are governed by numerous pieces of legislation, such as: (i) Law No. 85/09 of 4 July 1985 on expropriation for the public purposes and conditions for compensation; (ii) Decree No. 87/1872 of 16 of December 1987 relating to the implementation of the above-mentioned law; (iii) Decree No. 2003/418/PM of 25 February 2003 fixing the rates of compensation to be allocated to owners whose planted crops and trees are destroyed in the public interest; (iv) Decree No. 2014/3211/PM of 29 September 2014 fixing the minimum prices for all transactions relating to private State land; and (v) Order No. 00832/T.15.1/MINUH/D00 laying down the bases for calculating the market value of buildings slated for expropriation for public purposes. Copies of these instruments have been given to the local residents to ensure better ownership on their part. The team leading the public consultation has given them the necessary clarification. Also, most of their concerns are addressed in the Comprehensive Resettlement Plan (CRP). Some of these concerns, such as those relating to the reconstruction of community infrastructure and facilities, are taken into account in the ancillary developments.

9.6 *Future Consultations*

Article 20 (2) of Decree No. 2013/0171/PM of 14 February 2013 laying down procedures for conducting environmental and social impact assessments defines the modalities for public participation in the conduct of assessment. Unfortunately, nothing is defined concerning public participation in the project implementation phase. However, the participatory approach and the consultation of the population will continue during the project appraisal and implementation phases, especially: (i) validation of the resettlement plan; (ii) installation of the site and works start-up; and (iii) establishment of the baseline situation and project impact monitoring and evaluation. The consultations should help to implement the measures recommended in the Environmental and Social Management Plan (ESMP).

The participation of local residents will consist in: (i) working with the team responsible for making an inventory of property to be compensated for; (ii) participating in awareness meetings: each person must not only receive the messages from awareness officers, but should spread such messages within his/her his family; (iii) resorting to normal channels when they are aggrieved (Environmental Officer of the control mission, security service, etc.) rather than taking the law into their own hands by blocking the progress of project activities; (iv) reporting all cases of environmental violations observed during the works implementation; (v) setting up

environmental and road protection committees; (vi) participating in road maintenance works through environmental and road protection committees.

This summary will be posted on the Bank's website and supplements the one already posted on the website concerning the rehabilitation of the Yaoundé-Bafoussam-Babadjou section:

- For ESIA (<http://www.afdb.org/fr/documents/document/cameroon-transport-sector-support-programme-phase-2-yaounde-bamenda-road-section-summary-esia-11-2015-84550/>) and ;
- For RAP (<http://www.afdb.org/fr/documents/document/cameroon-transport-sector-support-programme-phase-2-yaounde-bamenda-road-section-summary-arap-11-2015-84549/>).

10. SUMMARY OF ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN COSTS

Table 7 below presents the summary of the costs of project environmental and social measures (excluding expropriation).

*Table 7
Summary of the Costs of Project Environmental and Social Measures*

ENVIRONMENTAL AND SOCIAL MEASURES	Cost (CFAF)
Annual remuneration of Contractor's Environmental Officer	18 000 000
Soil, Landscape, Surface Water and Groundwater Protection	3 600 000
Support to the people in areas of conventional stockbreeding and fish farming	9 700 000
Fight against theft and crime	2 200 000
Protection of the cultural and archaeological	3 500 000
Awareness-raising	96 700 000
Development of a compensatory tree-planting policy/approach and compensatory tree-planting	347 500 000
Capacity building for MINTP staff	32 460 000
Capacity building for members of the ESMP Monitoring Committee	12 205 000
School safety	324 800 000
Development of drying and construction areas and equipment for agricultural products processing units (UTA) and market sheds	94 200 000
TOTAL	944 865 000

Source: ESIA Report

11. CLIMATE CHANGE

11.1 Major Challenges

At national level

According to the National Communication on Climate Change (2005), the areas considered as climate change vulnerability areas are the coastal and Sahelian zones. The most significant negative impacts are expected in the agricultural and livestock sectors in the Sudan-Sahelian region, mangroves and industrial infrastructure in the coastal zone. The coastal zone generally concerns the littoral region and the maritime areas of the South and South-West regions. The project is located outside this zone.

In the project area

Based on the vulnerability analysis conducted by the Bank's Climate Safeguards System, the project has been classified in Environmental Category 2:

- ***Abundant rainfall:*** Abundant rains foster storm water erosion which mainly results in the creation of gullies. Consequently, when potholes are formed on the roadway, lack of maintenance and rapid intervention, combined with heavy rainfall, aggravate road degradation and affect its durability.
- ***Risk of flooding at the PK0:*** It was also reported that at the PK0 (SNEC bridge), the river Kienké rises during floods and overflows its banks and floods the pavement at the level of the bridge.
- ***Greenhouse gas emissions:*** Substances emitted in the form of gas, particularly nitrogen oxides NO and NO₂, stand at 10 kg/year per vehicle. Annual unburnt hydrocarbons stand at 38 kg per vehicle. The improvement of the state of the road will generate slightly more traffic (2% annually), with the resulting increase in the number of vehicles which are emission sources.

11.2 Adaptation

The project has incorporated these challenges at various levels:

- Evaluation of the state of all water supply facilities;
- Habilitation/construction of those that are in a critical state and cannot be used, as well as cleaning/clearing of those that are clogged, cleaning of outlets, etc.;
- As a result, the Bill of Quantities includes the construction of water slopes on embankments, covered gutters at town crossings and open gutters in the countryside. This will be accompanied by awareness-raising on environmental protection (avoid clogging gutters with all types of solid wastes, disorderly installation, etc.). Evacuation facilities should be designed to reduce soil stripping by rainwater;
- Run-off control is a critical factor for road durability. Such control requires not only the construction of evacuation facilities, but, above all, their maintenance in a regular operating state. The road management and maintenance by service level (GENIS) methods have been proposed in the project for road rehabilitation and upgrading works contracts to optimize the use of Road Maintenance Fund resources. Such maintenance will be carried out over a ten-year period and contribute to reducing the impact of climate on road durability.

The proposed measures are consistent with those proposed in the Bank's Adaptation Review and Evaluation Procedures (AREP) for road projects. The costs of these measures have been included in the cost of ESMP for building capacity to monitor climate change measures.

11.3 Mitigation

The construction of the road will help to increase average traffic speed, which will lead to freer-flow of traffic and generally lower emission ratios than those of current speeds (atmospheric emission ratios are generally inversely proportionate to traffic speeds). The upgrading of urban road networks and the construction of the interchange will further increasing traffic speed. In addition, the project provides for reforestation/restoration of 363 ha. This will, at least, help to sequester part of the emissions caused by the road. Regarding this last point, tree species will be selected in collaboration with MINFOF services of the Ministries concerned and those of FAO. Monitoring will be conducted in three phases:

- **During the works:** Monitoring will be conducted by MINTP's Environmental Unit through the Monitoring Committee which includes MINEPDED and MINFOF. The duties of this committee will be programmed to coincide with site meetings. MINTP will bear the costs of monitoring during the construction phase, including the monitoring of tree planting.
- **During the guarantee period:** This phase is critical for plant growth. Monitoring will still be conducted by the Monitoring Committee, but after every four months. At the end of this phase, an evaluation report will be prepared by each service, including MINEPDED and MINFOF.
- **After the guarantee period:** After this phase, the services concerned will take over as part of their official activities. To that end, the cost of monitoring will be incorporated into the operating costs of the services concerned. Regarding trees and green spaces in the cities concerned by the project, the various city councils will be responsible for monitoring, in collaboration with MINFOF services. The city of Bamenda, for example, maintains its green spaces through a contract with a specialized NGO.

In addition to these arrangements, the contract for road management and maintenance by service level (GENIS) will provide the opportunity for better monitoring of the adaptation measures described above, as well as the maintenance of trees many years after the guarantee period.

12. INSTITUTIONAL CAPACITY AND CAPACITY BUILDING PLAN

Given the scope of the project and the arrival of new staff in the MINTP unit responsible for environmental issues, provision has been made to build the capacity of the staff of the said unit. The staff includes: (i) the Environmental Control Officer; (ii) the Head of the Infrastructure-Environment Protection Unit; and (iii) members of ESMP Divisional Monitoring Committees. This capacity building will focus on themes such as the following: (i) General Notions on the Environment; (ii) Environmental Conventions; (iii) Institutional and Regulatory Framework for Environmental Management in Cameroon; (iv) Procedures for Conducting Environmental Impact Assessments and Audits in Cameroon; (v) Project Environmental Impacts and Planned Environmental Measures; (vi) Environmental and Social Monitoring of Road Projects; (vii) Environmental and Social Monitoring Procedures relating to the Project; and (viii) Monitoring of Climate Change Adaptation Measures.

13. CONCLUSION

The second phase of the Transport Sector Support Programme, Grand Zambzi-Kribi section, as presented in this assessment, will have considerable negative environmental impacts, which should be mitigated or optimized, as appropriate. The possible negative project impacts during the works and operation phases generally range from moderate to high. If the proposed measures and recommendations are taken into consideration, the various project components would blend harmoniously into their environment and the project would be environmentally and socially viable.

Project Title: Second Transport Sector Support Programme - Rehabilitation of the Yaounde-Bafoussam-Bamenda Road - Development of the Maroua-Bogo-Pouss Road and the Grand Zambi-Kribi Road **Code SAP: P-CM-DB0-015**
Country : Cameroon
Department : OITC **Division:** OITC-1

3. INTRODUCTION

This document is a summary of the Environmental and Social Impact Assessment (ESIA) for the Maroua-Bogo-Pouss road section under Phase 2 of the Transport Sector Support Programme. This ESIA covers the road and related infrastructure, as well as some of the institutional support needs of the transport sector. The studies for this section were conducted in 2016, and this summary was prepared in accordance with AfDB environmental and social assessment guidelines and procedures for Category 1 projects.

The document starts by presenting the project description and rationale, followed by the legal and institutional framework in Cameroon. A brief description of the main environmental conditions in the project area is presented through its physical, biological and human components. A comparison of project variants and alternatives is then presented. This is followed by a presentation of the main positive and negative impacts on the biophysical and human (socio-economic) environments. Next comes a presentation of the rehabilitation and mitigation measures proposed to enhance project benefits and/or prevent, reduce, mitigate or offset any negative impact, or manage the environmental risks. In light of the foregoing, a monitoring programme is proposed. Public consultations held under the project and the measures taken to continue consultations during project implementation are presented, together with additional initiatives under the project.

2. POLITICAL, LEGAL, ADMINISTRATIVE AND INSTITUTIONAL FRAMEWORK

2.1 Legal Framework in Cameroon

The national legal framework for the project's environmental component essentially comprises the following laws and regulations: (i) Framework Law No. 96/12 of 5 August 1996 governing environmental management; (ii) Decree No. 2013/0171/PM of 14 February 2013 defining the conditions for conducting environmental and social impact assessments; (iii) Order No. 0070 /MINEP of 22 April 2005 defining the various categories of operations subject to complete and summary impact assessments; (iv) Decree No. 2011/2582/PM of 23 August 2011 defining the conditions for protecting the atmosphere; (v) Decree No. 2011/2583/PM of 23 August 2011 regulating sound and odour nuisances; (vi) Decree No. 2011/2584 / PM of 23 August 2011 defining the conditions for soil and subsoil protection; (vii) Decree No. 2011/2585/PM of 23 August 2011 establishing a list of harmful or hazardous substances and their terms of disposal in inland waters; (viii) Order No. 001/MINEP of 3 April 2013 defining the organization and functioning of Divisional Committees for Monitoring the Implementation of Environmental and Social Management Plans (ESMP); (ix) Law No. 94/01 of 20 January 1994 defining forestry, wildlife and fisheries regulations; (x) Decree No. 95/531/PM of 23 August 1995 defining the conditions for implementing forestry regulations; (xi) the January 1998 standards governing intervention in forest areas; (xii) Law No. 98/005 of 14 April 1998 defining regulations governing water resources; (xiii) Order No. 039/MTPS/IMT of 26 November 1984 defining the general measures governing hygiene and safety at the workplace; (xiv) Law No. 91/008 of 30

July 1991 on the protection of the cultural and natural heritage given the importance attached to tourism and tourist sites and the archaeological heritage that may be discovered during works. From the environmental standpoint, the road sector is governed by Circular No. 908/MINTP/DR on guidelines for mainstreaming environmental impacts into road maintenance; Law No. 96/67 of 8 April 1996 to protect national roads, which defines the road right-of-way as defined in the land laws, as well as Decree No. 2005/330 of 6 September 2005 organizing the Ministry of Public Works.

With respect to affected property, the national legal framework governing compensation comprises: Law No. 85/09 of 4 July 1985 on Expropriation for Public Purposes and conditions of compensation; Order No. 00832/4.15.1/MINUH/D000 defining the terms for implementing Law No. 85/09 of 4 July 1985 on finished and unfinished constructions; Decree No. 2003/418/PM of 25 February 2003 determining the rates for compensation to be paid to owners of crops and cultivated trees destroyed for public purposes.

2.2 International Agreements

Cameroon is signatory to most international and regional agreements on environmental protection, prominent among which are: (i) the 1972 Paris UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage; (ii) the CITES Convention of 1973; the 1992 Rio United Nations Convention on Biological Diversity (CBD); (iii) the United Nations Framework Convention on Climate Change (UNFCCC); (iv) the Rotterdam Convention on Prior Informed Consent (PIC) and the Stockholm Convention on Persistent Organic Pollutants (POPs); (v) the International Tropical Timber Agreement of Geneva; (vi) the 2003 African Convention on the Conservation of Nature and Natural Resources signed in Maputo to ensure sustainable development of African economies; and (vii) Cooperation and Consultative Agreement among Central African States on the Conservation of Wildlife and the Creation of a Special Fund for the Conservation of Wildlife.

As regards climate change, Cameroon's intended nationally determined contribution (INDC) under COP 21 is to reduce its carbon footprint by 32% before 2035. Once the Paris agreement has been signed and ratified, the INDC will become a reference mechanism for the country.

2.3 Institutional Framework in Cameroon

Environmental management in Cameroon is the responsibility of the Ministry of the Environment, Protection of Nature and Sustainable Development (MINEPDED). Since the project covers several sectors, the Inter-Ministerial Environment Committee (IEC) for Validation of this ESIA Report and the Registration and Assessment Commission (CCE) responsible for assessing the affected property are involved. Under these organs, the following Ministries will be involved at various levels: the Ministry of Forestry and Wildlife (MINFOF); the Ministry of Public Works (MINTP); the Ministry of Energy and Water Resources (MINEE); the Ministry of Industry, Mines and Technological Development (MINIMIDT); the Ministry of Agriculture and Rural Development (MINADER); the Ministry of Livestock, Fisheries and Animal Industries (MINEPIA); the Ministry of Territorial Administration and Decentralization (MINATD); and the Ministry of Lands, Surveys and Real Estate Affairs (MINDCAF).

Apart from these Ministries, the activities of the project will involve local and municipal councils, local village communities, local support organizations (LSOs) and the most active

NGOs in the project area that are responsible for environmental protection such as WWF, Nature Cameroun, etc.

2.4 For the African Development Bank (AfDB)

The framework for the AfDB is the Integrated Safeguards System (ISS) of 2014 with its five operational safeguards:

- Operational Safeguard 1: Environmental and social assessment;
- Operational Safeguard 2: Involuntary Resettlement - land acquisition, community displacement and compensation;
- Operational Safeguard 3: Biodiversity and ecosystem services;
- Operational Safeguard 4: Prevention and control of pollution, greenhouse gases, dangerous material and efficient use of resources;
- Operational Safeguard 5: Working, health and security conditions.

The other relevant policies and guidelines remain applicable if triggered under the ISS. These are, essentially:

- The Bank's gender policy (2001);
- Framework for Enhanced Engagement with Civil Society Organizations (2012);
- Disclosure and Access to Information Policy (2012);
- Handbook on Stakeholder Consultation and Participation in Bank Operations (2001);
- Bank Policy on Population and Implementation Strategy (2002);
- Environmental and Social Assessment Procedures for the Bank's Operations (2015).

7. PROJECT RATIONALE AND DESCRIPTION

3.1 *Rationale*

Given the scope of the works following Cameroon's reclassification to "blend country" status, it was agreed that the AfDB's intervention will follow a programme approach, in several phases, within the transport sector. Apart from the Batschenga-Ntui-Yoko-Lena road development project over a distance of 248.6 km, the first phase concerned an urban component and technical assistance to the governance sector. It was approved in November 2014, and progress has been satisfactory. The current second phase of the programme concerns rehabilitation of the Yaounde-Bafoussam-Babadjou road and development of the Maroua-Bogo-Maga-Daniel and Grand-Zambi-Kribi roads. **This ESIA summary focuses on the Maroua-Bogo-Maga-Pouss road section.**

The Maroua-Bogo-Maga-Pouss road is an good example of a project that suitably blends urgency with development and most exceedingly addresses the concerns of TFPs (AfDB, World Bank, European Union, AFD, UNDP, UNHCR) who met in Yaounde for a discussion that revealed the urgent need for further development in the disadvantaged Far-North and East Regions which have been ravaged by Boko Haram attacks and the war in the Central African Republic. Indeed, the construction of this road should develop the economic potential of the project area, especially cotton and cereal cultivation, stockbreeding and handicraft activities. The zone is also renowned for its tourism activities, thanks to the national parks of Waza and Kalamaloué, the beautiful sites of Rhumsiki and Djingliya, the Mindif peak, and Koza hills.

3.2 Project Objectives and Components

The overall goal of the project is to open up access, develop agricultural potential and boost trade in the relevant regions of the country. The specific objective of the project is to enhance the service level within the transport logistical chain between Yaounde-Bamenda, Maroua-Pouss and Olama-Kribi and thus improve the living conditions of the people in these areas.

The total cost of PAST-2, net of taxes and customs duties, is UA 354.736 million (or CFAF 295.036 billion), at the November 2015 exchange rate of UA 1 = 831.707. PAST-2 will be financed by the Bank Group through the AfDB Window, the Development Bank of Central African States (BDEAC) and national counterpart contributions. The Bank Group will intervene through an AfDB loan of UA 218.042 million or 61.47% of the project cost, while BDEAC will contribute UA 60.000 million. The national counterpart contribution is estimated at UA 76.694 million or 21.62% of the total project cost.

Table 1 below presents the various project components.

*Table 1
Programme Components*

Component Name	Description
ROAD WORKS	1.17. Rehabilitation of the degraded Yaounde-Bafoussam interurban section (228 km); 1.18. Development of the Maroua - Bogo - Maga Pouss road (93 Km); 1.19. Development of the Grand-Zambi-Kribi road (55 km); 1.20. Development of 50 km ¹ of urban roads in the major towns crossed by the project road; 1.21. Construction of infrastructure as well as weighing and load control devices between Yaounde and Babadjou; 1.22. Routine and periodic maintenance of the Yaounde-Bafoussam-Babadjou road section over a ten-year period using the GENIS method; 1.23. Awareness-raising on environmental protection and road safety; 1.24. Works control and supervision.
RELATED WORKS	1.9. Rehabilitation and/or equipment of basic socio-economic infrastructure; 1.10. Support for specific activities of women's associations (CPF, multifunctional platforms, etc.); 1.11. Rehabilitation of rural markets along the road; 1.12. Control and supervision of related works.
STUDIES AND INSTITUTIONAL SUPPORT FOR THE ROAD SECTOR	3.1. Technical assistance to build the institutional capacity of the Ministry of Public Works (MINTP) in road project monitoring and coordination; 3.2. Transport sector strategy development; 3.3. Feasibility study on the establishment of a road agency; 3.4. Final design of the Bafoussam urban bypass road; 3.5. Final design for widening the northern dual carriageway into Yaounde and the North-South dual carriageway into Bafoussam.

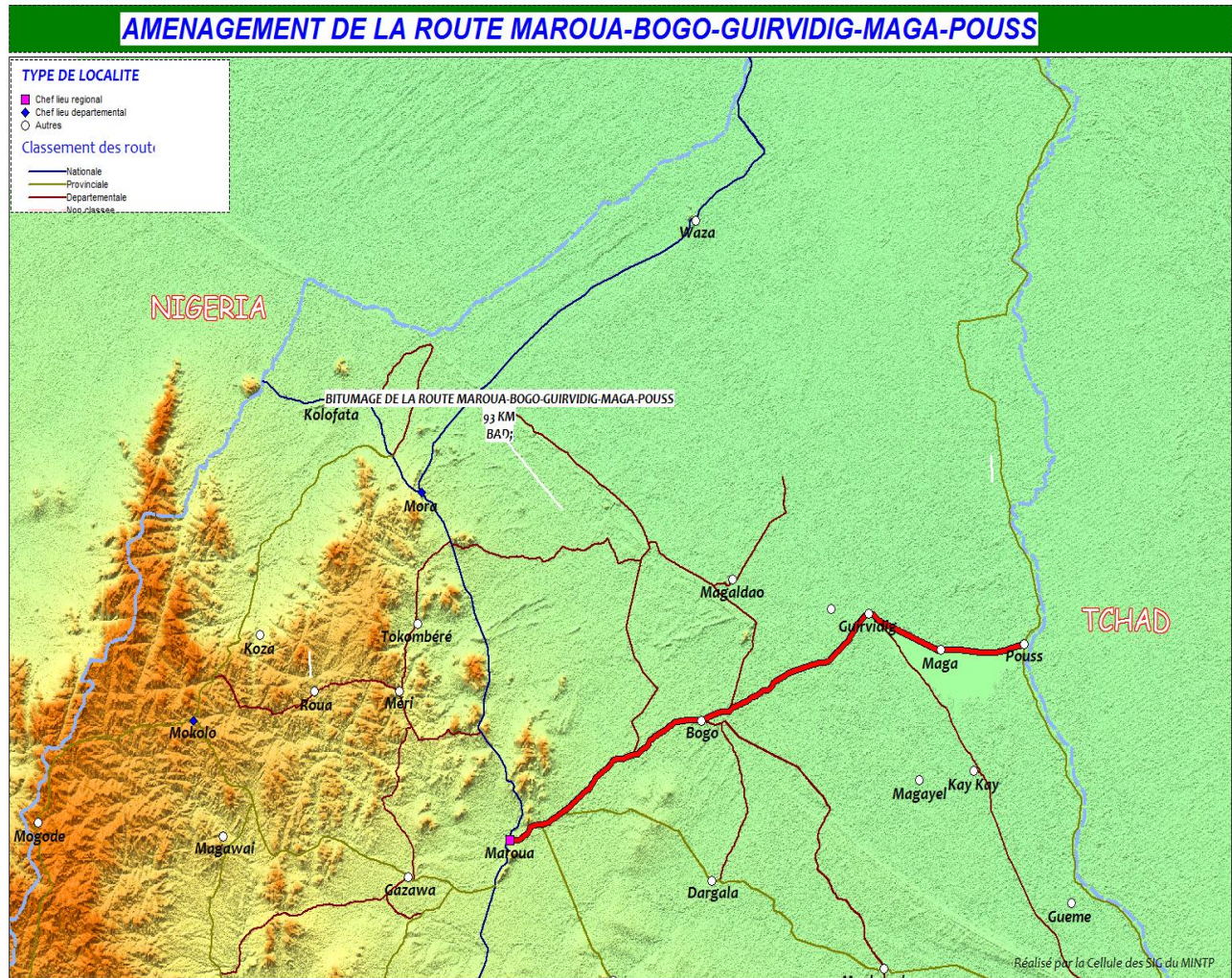
¹ This sub-component is an integral part of the ESIA for the sections concerned. No roads are concerned within the Grand Zambi-Kribi section. For the Yaounde-Bamenda section, it concerns 40 km whose ESIA and resettlement plan were approved in 2015 by the Bank. The ESIA for the Maroua-Pouss section covers a 10 km section.

PROJECT MANAGEMENT	3.1 Support for the Project Monitoring and Coordination Unit; 1.2 Monitoring-evaluation of socio-economic and environmental impacts; 1.3 Project accounting and financial audit; 1.4 Technical audit of the project.
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Source: PCN of the project

Figure 1 below shows the location of this road section.

Figure 1
Location of the road section



Source: REP, March 2016 version

7.3 Current State of the Road

The entire 94.7 km - long Maroua-Bogo-Maga-Pouss road is motorable, with certain areas likely to fall into disrepair (mud holes, collapsing drainage culverts). It has an urban section of approximately 2.5 km that cuts across Maroua III (Dakar). The road is unpaved and lined with trees on both sides right up to Bogo junction.

The technical characteristics of the project road are: (i) a life of 15 years; (ii) the study section is 100 m; (iii) the length of the road is approximately 94.7 km; (iv) the breadth of the right-of-way,

including the cleared areas, is 40m; (v) the breadth of the paved road surface is 7m; (vi) the shoulders are 2 x 1.50 m; and (vii) the reference speed is 80 km/h.

7.4 Key Inputs Required

Water: Large volumes of water will be needed, particularly for mixing concrete, optimum compacting of the different layers of material used to build the road formation, and for various clean-ups on the project sites.

The criteria for choosing the watercourses from where water will be drawn for the construction site include flow rate and water quality. The road section concerned does not run over any watercourses. Since the dry season is very long in this region (9 months) and the *mayos* are seasonal, the tapping of water for construction purposes should take these parameters into account.

Table 2
Watercourses identified along the project right-of-way

Name of watercourse	District	Locality	PK	Comments
Lake Maga	Maga	Maga	70 to 94+ 700	Lake embankment skirts the road
Mayo Vrick	Maga	Maga	75+900	No flow; river bed is silted
Canal 1	Maga	Maga	84+800	No flow; dry river bed
Canal 2	Maga	Maga	91+300	Steady flow
Canal 3	Maga	Maga	93+800	Steady flow
Logone	Maga	Pouss	94.7	Steady flow

Source: CARFAD surveys, 2016

Fuel: The operation of construction machinery and vehicles is heavily dependent on the supply of fuel and lubricants (oil and grease). Accidental spillage from handling of these products may pollute various environments. The same applies to waste resulting from their use (drain oils).

Laterite Borrow Sites: The need for road construction materials will require the operation of borrow sites and quarries. Two borrow sites for laterite that may be operated during the works were identified by Labogénie. These sites are presented in Table 3 below.

Table 3
Location of Laterite Borrow Sites.

No.	Pk	Side	Locality	GPS Position	Comment
7.	18+665	D	Balaza	N10°39'04,9'' – E014°28'26,8''	Situated 5 km away from PK 18+665
8.	18+665	G	Djoulgouf	N10°37,1'18,1'' – E014°28'32,7''	Situated 8.8 km away from PK 18+665

Source: Labogénie

These are 2 (two) borrow sites for lateritic sand-gravel aggregate used for road maintenance in the area. The material is obviously in abundant supply and contains lateritic nodules. These borrow sites, whose access roads are in pretty good condition, were identified by Labogénie.

Rock Quarries: There is no stone quarry in the project area itself. The data presented in the table below relate to quarries outside of Maroua.

Table 4
Location of Quarries

No.	Pk	Locality	GPS Position	Comments
9.	0+000	Tchééré	N10°42'56,8'' E014°15'29,7''	– Situated 17.6 km before PK 0 + 000; the access route to this quarry is 6 km long and in very poor condition
No.	Pk	Locality	GPS Position	Comments
10.	0+000	Salak	N10°24'10,5'' E014°14'17,3''	– Situated 36 km before PK 0 + 000; the access route is in good condition

Source: Labogénie

Access roads will be developed to operate these quarries. The other quarry sites in the region are: (i) Kong-Kong located 70 km from Maroua on NH1; (ii) Mokong located 45 km from Maroua on RP2; and (iii) Waza located 120 km from Maroua on NH1.

Sand Deposits: Sand abounds in the area, especially on the beds of the *mayos*. The table below presents sand deposits.

Table 5
Location of Sand Deposits

District	Locality	PK	Side	Distance from the road (m)	Administrative unit
Maroua III	Maroua III	0	D	500	Mayo Kaliao
Maroua III	Bogo	18+00	D	500	Mayo Tsanaga in Balaza Alkali
Maroua III	Bogo	33+300	D	1000	Mayo Tsanaga in Bogo

Source: CARFAD surveys, 2016

Other sand extraction sites are found in certain watercourses (*mayos*). Their operation could generate taxes for municipalities or economic benefits for local residents.

Installation sites of plants for mixing concrete, crushing aggregate, and preparing bitumen:

The plants for mixing concrete, crushing aggregate and preparing bitumen are among the classified establishments and would need appropriate installation and operating sites (in terms of land surface area, distance from built-up areas and sensitive sites, topography, etc.).

Labour: The construction site needs, in terms of number of workers, have not yet been estimated. However, priority will be given to labour-intensive works, since it is usually possible to replace machines with human labour, which limits the impact of works on the environment. Manual tasks like clearing, cleaning of the facilities and others can be outsourced to local residents.

4. DESCRIPTION OF THE PROJECT ENVIRONMENT

Direct Impact Area: On the whole, it comprises the road right-of-way, as well as all borrow sites (for sand and laterite), quarries, construction sites, and access roads to these zones and sites. Apart from areas where the road alignment may be adjusted, paving works on the Maroua - Bogu-Pouss road will be limited to the right-of-way already occupied by the current route, composed of two earth road sections (Maroua - Bogu and Guirvidig - Pouss) and a paved but highly degraded section (Bogu - Guirvidig).

Indirect Impact Area: The indirect impact areas are, first of all, the townships and districts traversed by the road. These are: Balaza Lamido, Balaza Lawane and Kodek townships in Maroua III Subdivision; Madaka, Magoumaï and Bogu Centre in Bogu Subdivision; and Guirvidig, Maga Centre and Pouss in Maga Subdivision. The area also includes Maroua town, the Far North Region, the entire Grand North and the southern part of Cameroon, mainly in terms of facilitation of beef supplies from the Bogu cattle market to these areas.

Cumulative Impact Area: The cumulative impact area comprises several locations, namely: (i) Maroua, which is the junction between the current project and the Maroua-Mora road rehabilitation project; (ii) Maga Subdivision, where the Flood Emergency Project (PULCI) is being implemented; (iii) Maroua III, Bogu and Maga Subdivisions, where the activities of the Cotton Development Corporation (SODECOTON) and the Rice Farming Expansion and Modernization Corporation (SEMRY) in Yagoua contribute to the socio-economic development of various communities. These same Subdivisions fall within the implementation area of the Lake Chad Basin Sustainable Development Programme.

4.1 Physical Environment

Climate and Climate Change

The project area has a dry tropical climate with two seasons: a dry season and a rainy season. The dry season is very long (8-9 months) and runs from October to May. The duration of the rainy season varies between 4-3 months. In recent years, the rainy season tends to start later (June) and end in September. The annual rainfall recorded around Maroua ranges from 600 to 900 mm.

The convergence of dry winds from the Sahara and wet winds from the South causes unpredictable storms that are quite characteristic of the climate in the region and are responsible for the wide fluctuations in rainfall. The dwindling rainfall is causing a decline in superficial groundwater levels, resulting in the rapid drying-up of river beds in the dry season. There is a high concentration of rainfall exceeding 200 mm during the months of July and August (OLIVRY, 1986). The intensity of storms causes flooding like the floods of August 2012 which caused material damage and loss of human life (EGIS Cameroun, 2014). During those two months, certain sections of the current road are flooded because of the low-lying road surface and the lack of drainage culverts. This makes traffic movements extremely difficult.

Air Quality and Sound Environment

In the dry season, vehicles plying the Maroua-Bogo and Guirvidig Pouss earth road sections raise thick clouds of dust that remain suspended in the air for a fairly long time. Measurements of atmospheric particulate matter along the banks of Lake Maga give fairly low values relative to those recommended by WHO, ranging from 0.1 to 1.3 mg / m³ of air (Rainbow Environment Consult, 2015).

The noise levels measured on the project site (i.e. along the banks of Lake Maga) vary from 35 to 72 decibels in terms of intensity to the ear and from 43 to 78 decibels in terms of intensity in a vacuum. These values are all below the continuous exposure limit of 70 decibels recommended by WHO (Rainbow Consult, 2015). Higher values are recorded in the immediate vicinity of the road when vehicles pass or in Maroua town which is a completely urban area.

Relief

The project area has a flat and monotonous relief, with gentle slopes in places. These are plains called "*Yaérés*" and are a natural extension of the alluvial plain of the great Lake Chad basin. After heavy rains, the runoff waters stagnate, accumulate and build up into a flood on account of the flat terrain.

Hydrography

All the watercourses in the project area flow only seasonally, hence their appellation "*mayos*". (OLIVRY 1986). The hydrographic network is subject to a tropical Sahel regime with heavy, annual flash floods as soon as it starts raining. The *mayo* regime is influenced more by the length of the dry season and/or the duration/intensity of the rainy season.

The area has a reservoir structure, namely the Maga dam (35 000 ha) formed by a compacted clay dyke that is 27 km long and 2 to 7 metres high, between Guirvidig and Pouss (OLIVRY, 1986), which is vital for residents, animals and plants. The three *mayos*, whose waters flow into the lake are: Mayo Guerléo, Mayo Tsanaga and Mayo Boula. The permanent watercourse is River Logone located at the end of the project area (PK 94+7).

The seasonal watercourses are: (i) Mayo Tsanaga; (ii) Mayo Vrick.

Water Quality

The quality of well water is such that the water can be used by road construction companies for project water needs. Physical and chemical tests on water samples taken from 3 wells selected randomly from the area led to the finding that the water can be used for concrete preparation and other project needs (Table 6).

Table 6
Physical and Chemical Quality of Groundwater

Item	Unit	Value			WHO Guidelines
		Well 1	Well 2	Well 3	
pH at 25°C	(H ₃ O ⁺)	7.12	7.02	7.43	6.5 ≤pH≤ 8.5
Electrical conductivity at 25°C	µS/Cm	442	242	144.0	2500
Total dissolved solids	Mg/L	221	215	-	≤1000
Turbidity	NTU	5.2	2.5	1.4	≤ 5
Total hardness	Mg/L	67	87	2	≤ 400
Ammonium (NH ₄ ⁺)	Mg/L	0.67	0.84	00.0	≤1.5
Calcium (Ca ²⁺)	Mg/L	34.0	36.0	0.7	≤ 100
Magnesium (Mg ²⁺)	Mg/L	8.0	6.8	15.4	≤ 50
Sodium (Na ⁺)	Mg/L	28.0	24.8	3.2	≤ 200
Potassium (K)	Mg/L	4.0	4.5	2.0	≤ 12
Iron (Fe ²⁺)	Mg/L	0.05	0.15	00.0	≤ 0.3
Bicarbonates (HCO ₃)	Mg/L	46.0	28.0	4.6	≤ 400
Chlorides (Cl)	Mg/L	12.0	21.0	00.0	≤ 250
Sulphates (SO ₄ ²⁻)	Mg/L	16.0	15.0	00.0	≤ 250
Nitrates (NO ₃)	Mg/L	5.0	6.2	6.1	≤ 50

Source: Mr. GUE Oudah Ali, Head of Testing - Water Quality Division 2013 EGIS Cameroon, 2014.

Relief and Pedology

The project area, much like the entire Far-North Region, is mainly characterized by alluvial formations. The main soils in the area are vertisols, heavy mineral soils, and hydromorphic soils.

Vertisols (clay) are predominant. These are sandy clay or Karal soils. Karal soils are unsaturated clay soils from the montmorillonite family. These soils are generally very sensitive to wind and water erosion.

The rough mineral soils are represented by two sub-classes: non-climatic rough mineral soils eroded from various rocks and non-climatic rough mineral soils eroded from old lateritic crusts.

The hydromorphic soils are permanently flooded and ideal for off-season farming.

Given the planned road works, these soils do not have good geotechnical characteristics, hence the need to truck in laterite. Another possibility is to recycle and reinforce the existing pavement as a foundation for the paved segment between Bogo and Guirvidig.

4.2 Biological Environment

Vegetation

The project area is covered by a Sudano-Sahel vegetation (shrub land) and consists of periodically flooded meadows (*Yaérés*) (Letouzey (1985)). It is heavily degraded mainly due to intensive agricultural activity, overgrazing and wanton deforestation for fuel wood. The shrub species are *Acacia seyal*, *Acacia nilotica*, *Borassus aethiopum* and *Tamarindus indica*. The other

tree species are: shea (*Butyrospermum parkii*), néré (*Parkia biglobosa*), red kapok tree (*Bombax costatum*), tamarind (*Tamarindus Indica*), baobab (*Adansonia digitata*), desert date (*Balanites aegyptiaca*), jujube (*Ziziphus manitiaca*), mango (*Mangifera indica*), neem (*Azadirachta indica*), and eucalyptus (*eucalyptus camadulensis*). The grass cover is very tall (2 or more metres) during the rainy season and the most prevalent herbaceous species are *Hygrophila auriculata* and *Sorghum arundinaceum*.

Wildlife

The project area has numerous wildlife species. Apart from domestic animals, there are avian and aquatic species, in particular. The most predominant large mammals are the lion (*Panthera leo*), waterbuck (*Kobuskob Kob*), roan antelope (*Hippotragus equinus*), korrigum (*damaliscus korrigum*), red-fronted gazelle (*Gazella rufifrons*), African elephant (*Loxodonta africana*), giraffe (*Giraffa camelopardalis*), spotted hyena (*Crocutacrocuta*), striped hyena (*Hyenahyena*), jackal (*Canis aureus*), and patas monkeys, etc.

The avifauna is rich and diverse, including the grey sparrow, passer griseus (*Passeriforme, Ploceidae*), sunbird (*Nectarina pulchella*), bulbuls, village weaver birds, the *Stephanoectas coronatus* eagle and the hawk, *Accipiter castalinius*, the white-backed swift, apus affinis (*Apodiforme, Apodidae*), the dark swift, (*cypseloides niger*) (*Apodidae*), the *Corvus alba* pied crow, the slender-billed curlew, *Andropadus gracilirostris* (*Passeriforme, Pycnonotidae*) and *Hirundinidae* (*swallows*), *Riparia*, crested hummingbird *Orthoryncus cristatus* (*Trochilidae*) and the heron *bubulcus ibis* (*Ardeidae*).

As regards aquatic fauna, the available fish species are: catfish (*Clarias sp.*), Nile tilapia (*Oreochromis niloticus*), carp (*Lutianus sp*), "Kanga" (*Heterotis niloticus*), bagrid catfish, Nile perch and species like *Alestes dantes*, *Alestes nurse*, *Distichodis*, *Protopterus annectans*, *Calamoichthys calabaricus*, *Polypterus bichir*, *Pellonula miri*, *Xenomystus nigri*, *Pantodon buchholzi*, *Barbus ablabes*, etc.

The Far North Region Wildlife Service also noted that the elephants have a migration corridor in the project area. The corridor is located in Bogo, behind the Subdivisional Office (PK 32). This corridor is stable and known to the population, but is neither demarcated nor protected. Elephants use this corridor to move between the Waza National Park and the Kalfou forest reserve in search of food and water or to flee floods. The route covers a distance of almost 200 km. The reforestation planned under this project could target this corridor. According to the Head of the Regional Wildlife Service, this would both demarcate the corridor and combat climate change.

Lake Maga has an extremely rich biodiversity. It is the main fish reservoir for Maroua town and even the neighbouring countries of Chad and Nigeria.

It has carp, catfish, Nile perch, pike, bagrid catfish, heterocis, tilapia, hippopotamus, crocodiles etc. The birdlife includes crowned cranes and helmeted ducks, which are fully protected species. Apart from these protected birds, there are the "kelia, kelia", which are grain-eating birds that are unprotected because they have a large population and are particularly harmful to cereals. Terrestrial fauna is mainly composed of antelopes and waterbucks. All these species are protected. There are also monkeys, hyenas, warthogs, hedgehogs, and cane rats.

Protected Area

The protected areas in the Far North Region are: (i) Waza National Park; (ii) Kalamaloue National Park; (iii) Mozogo Gokoro National Park; and (iv) Kalfou forest reserve. The project does not affect these protected areas since the nearest one is located more than 30 km away from the road.

The Kalfou forest reserve is located approximately 45 km away from the project area and is very rich in animal species (lions, hyenas, elephants, giraffes, etc.). Waza national park is approximately 30 km away from the project area as the crow flies. One of the access routes to Waza national park is located in PK 35+900. Indeed, several herds of elephants leave Waza national park for extended stay in the agro-pastoral Mindif triangle composed of Moulvoudaye, Kalfou and Mindif Subdivisions. They disperse into small groups. The first group of about 200 head goes to Logone-Birni, a second group heads towards Chad to return at the start of the rainy season each year and a third moves to Mayo-Danay for an extended stay. This last group causes the most damage, because their corridor cuts across human settlement areas. Hence, after their passage, there is massive destruction of food crops and cotton plantations. Their intrusion into villages sometimes causes loss of human lives.

The following villages have a reforestation area: Balda, Djiddel, and Ouro Yaya. These areas were created under Operation Green Sahel.

Tourism in the national parks has declined drastically over the past few years on account of the security situation.

4.3 Human Environment

4.3.1 Population

The Far North Region, with an estimated population of 3,111,792 inhabitants (or 17.8% of the total national population), is the most populated region of the country. It covers an area of 34 263 km², or 7.4% of the national territory, with a population density of 90.8 inhabitants/km². These statistics come from the 3rd population census of 2010. Maroua town is said to have a population of 272,000 inhabitants. According to the same census, Bogo Subdivision has 21,046 inhabitants, while Maga has 15,701 inhabitants.

4.3.2 Land Use Planning and Management

Under customary law, the land is the property of the Lamido, who manages it in collaboration with the Djaouros and notables. The Lamido is responsible for regulating land use, making a distinction between pastureland and farmland. Land is handed down from father to son. However, ownership can be acquired through purchase. In such cases, the Lamido issues a deed of sale, and it is incumbent on the purchaser to regularize ownership by obtaining a land certificate.

4.3.3 Habits and Customs

The habits and customs in this locality relate to traditional and religious festivals, and the local cuisine of various communities.

4.3.4 Sacred and Cultural Sites

The sites sacred to the people of the project area are cemeteries, traditional palaces, and places of worship. During the investigation, only one place of worship, namely the mosque of Madaka village in PK 25+500, was identified within the project right-of-way. No cemetery, Lamidat or Sultanate, likely to be affected by the project road was detected. Historically, some villages in the project area have been existing for over 400 years. Indeed, the project area bears the imprint of the Sao civilization celebrated by historians for their mastery of terracota art. This civilization reached its zenith in the 16th century.

4.3.5 Security Situation

The security situation in the Far North Region and in the project area in particular is not the most stable. However, in the weeks leading up to this study, there was a lull that seemed to augur a return to peace.

The 2014-2015 crop year was heavily disrupted by cross-border insecurity fomented by the Boko Haram sect. Crops and income-generating activities in areas under direct threat (areas near Nigeria in Logone et Chari, Mayo-Sava, and Mayo-Tsanaga) were abandoned. Such a situation affects the population, which is forced to move elsewhere in order to survive. The insecurity also affected some Divisions of the Region, which were initially not considered to be on the front line. Hence, in Diamaré, there were huge population flows towards Maroua town.

Another sector severely affected by insecurity is education. Given the need to resettle refugees, schools have been requisitioned, thus dashing the hopes of thousands of children who aspire to gain education.

4.3.6 Gender and Poverty

In rural areas, women make a substantial contribution to farming activities, in addition to their day-to-day tasks of child upbringing (care, education, etc.), supplies (fetching water, firewood, wild fruits and medicinal plants) and domestic chores (cooking, cleaning, etc.). Rural women have limited access to both tangible (implements, inputs, etc.) and intangible (credit, training, etc.) factors of production. This explains why poverty affects more women than men. Furthermore, access to the main factor of production, namely land, is acquired through inheritance from which women are excluded in certain ethnic groups. Hence, certain customs impose all kinds of pressure on women, thereby hindering their development and maintaining them in a state of near-permanent vulnerability (EGIS Cameroun, 2013). In the Region, less than 15% of households are headed by women, with 67% of female household heads being widows and 41% being over 60 years old.

Despite the strong commitment of Cameroonian policymakers to mainstream gender into development policies, analysis of the gender situation in the project area reveals persistent inequalities. Indeed, the incidence of poverty among women is higher in the Far North Region at 62.9%. The literacy rate among women aged 15 to 24 years remains a cause for concern at only 17.4%, especially in the Far North Region. With regard to time spent on domestic chores, women generally devote more time (17 hours) to such chores than men (9 hours). It is fairly common practice for parents to withhold their children from school with the aim of compelling them to engage in condemnable work. It is a fairly widespread phenomenon that affects almost one out of every four girls, compared to 14.4% for boys. The proportion of girls engaged in an

economic activity is significantly higher than that of boys. The proportion of girls who neither attend school nor work is higher than that of boys in the same situation. As regards sectors of activity, women predominate in the tertiary sector (trade and services) compared to the secondary and primary sectors.

4.3.7 Socio-economic Activities

4.3.7.1 Agriculture

The agricultural significance of the Far North Region is felt throughout the country, since this region is the national bread basket in terms of its yields of specific products like onions, garlic, peanut, cowpea, etc. In 2010, it had 425,000 farming families, representing 80-85% of the region's population.

The crop varieties along the project road are extremely diverse, including corn, soybeans, sorghum, millet, sesame, cassava, potato, etc. There are two types of sorghum: dry season sorghum (Mouskwari) and rainy season sorghum. Vegetable farming is widely practised to produce watermelon, tomato, pepper, eggplant, squash and a variety of vegetables.

Family farms have a surface area of 2 to 5 ha for all crops, with farmers generally engaging in mixed cropping. Apart from the family farms, there are other types of farmers along the entire project road with larger farms of 12 to 15 ha, who mainly grow dry season sorghum that is all exported after harvest. The processing of agricultural produce is a livelihood for many households. This is mainly practised by women individually or in groups with equipment and very modest means. It is a seasonal activity and mainly involves peanut processed into oil and paste; cow pea processed into doughnut; millet processed into local beer (*bil bil*); and maize, rice and sorghum which are milled into flour. Agricultural activities are presented in detail in the subsequent paragraphs.

4.3.7.2 Stockbreeding

Stockbreeding is undoubtedly the most widely practised activity after agriculture. Almost all the inhabitants of the Far North Region are engaged in this activity and do practise free range stockbreeding. Each family has at least two head of cattle. Stockbreeding activities are much diversified in the region. According to the MINEPIA Regional Delegation for the Far North Region, the preferred species, in order of importance, are: cattle (454,698 head), sheep (675,215 head) and goats (795,019 head). The Maroua-Bogo-Pouss road project will be of major significance to herders. Currently, the Bogo cattle market virtually comes to a standstill at the onset of the rainy season because the road becomes non-motorable. Paving the road will keep the Bogo market operational on a daily basis. In order to maintain the quality of animals sold, the livestock services of the Region suggest the sinking of pastoral wells along the project road for watering the animals. According to experts in the field, such wells can be sunk after every 15 km, making a total of 7 (seven) wells.

4.3.7.3 Transhumance Corridors

Transhumance generally takes place between end-January and end-July. Transhumance corridors are pathways generally used by cattle in search of grazing land. The Far North Region is crisscrossed by these corridors, especially as stockbreeding is the predominant livelihood in the region. To protect the animals from road accidents, these corridors are often created far from highways. However, herders are sometimes forced to use the highways when they have no other

choice, especially when crops are beginning to grow and they wish to avoid conflict with farmers.

The first transhumance corridor begins from Chad, and crosses the Logone River to reach Pouss. From Pouss, farmers go to Guirvidig and then to Bogo. From Bogo, part of the livestock heads towards Nigeria. The second transhumance corridor also starts from Chad and reaches Gobo on Cameroonian territory. From Gobo, the animals go to Yagoua, and then to Moulvoudaye; from Moulvoudaye, they reach Bogo and then continue to Nigeria or Maroua. In other words, Bogo Subdivision is unavoidable. The third corridor starts from Hougno on Cameroonian territory or Chad to Doukoula. In this Subdivision, herders can choose any of three options. First of all, they can leave for Bogo or go to Guidiguiss and Dargala to end up in Nigeria. The other alternative is to go from Doukoula to Dziguilao and from Dziguilao towards North Cameroon through Mayo Louti Division.

4.3.7.4 Other Activities

Maga Subdivision has two fishing centres, namely the Maga and Tékélé fishing centres. The species fished from the lake are catfish, carp, Nile perch, pike, tilapia, sardines, bagrid catfish, African knife fish (*gymnarchus*), spotted catfish, eel, common fish, etc.

Sport hunting (i.e. hunting authorized through a hunting licence issued by the Ministry of Forestry and Wildlife) is practised in the Far North Region, particularly in Waza and Kalamaloue parks. It is controlled hunting that spares endangered species. Moreover, the inhabitants of certain villages hunt for self-consumption.

Handicraft activities are practised all along the project road. In most villages, the inhabitants weave *seko* used as fencing for compounds. Basket traps and nets are woven for fishing in Lake Maga. Hoes, axes, *dabas* (short-handled hoes), arrows, bows and machetes are manufactured by blacksmiths. Women weave traditional fabrics from the cotton. *Samaras* (leather items) are made from sheep skin.

4.3.8 Access to Basic Infrastructure and Services

- **Drinking Water:** Access to water is essential for life in the Far North Region. It is crucial for humans, animals and crops. Since the dry season is 9 months long, agriculture is based on watering and irrigation. Hence, wells and boreholes are of capital importance. The relevance of having pastoral wells along the transhumance corridors is therefore self-evident. The rate of access to safe drinking water remains very low throughout the entire Far North Region.
- **Electricity:** The electrified segment of the entire road alignment starts from Kribi and ends in Bissiang (i.e. approximately 15 km). The rest of the villages, up to Grand Zambi, are not electrified. Communities in these areas use hurricane lamps for lighting. This situation does not facilitate schooling for the young or promote income-generating activities which often require the use of small electrical appliances. This lack of electricity is one of the root causes of the growing rural exodus. Over 90% of households surveyed use firewood as cooking fuel.
- **Education:** Each village crossed by the project has at least one primary school. There are at least 26 government schools along the project road, most which do

not have sufficient classrooms. Moreover, they are not fenced and have neither staff houses nor latrines. They also lack water points. The situation is even worse for certain secondary schools, which share the same premises with primary schools.

- **Health:** There is widespread shortage of beds for patients. Official staff houses are non-existent and facilities are not fenced. This gives rise to surreal situations where herds of cattle overrun the premises of health institutions. There is also shortage of medical personnel. Bogo Subdivision, for instance, has a ratio of 2 doctors per 126,747 inhabitants. Consequently, health centre attendance is low (approximately 40%). This situation leaves the communities vulnerable since they do not have easy access to quality health care. Under these conditions, the communities understandably resort to self-medication or traditional pharmacopoeia. The result has been a resurgence of water-borne, endemic and pandemic diseases.

5. ANALYSIS OF ALTERNATIVES

5.1 *No-project Option*

Failing to implement the project (no-project option) would tantamount to abandoning this major highway of Cameroon and the sub-region in a state of advanced disrepair. Accordingly, considering the objectives assigned to the project by national authorities and the problems it seeks to solve, the "no-project" option is not advisable insofar as it goes against the Government's avowed policy of economic and social development.

5.2 *Project Option*

There are various road alignment options for linking Maroua to Pouss. From Bogo, these are: (i) Bogo-Magayel-Kay-Kay-Pouss; (ii) Bogo-Magaldao-Guirvidig-Pouss. These options were not selected for the following reasons:

1. They are longer than the Maroua-Bogo-Guirvidig-Maga-Pouss option;
2. They are economically less attractive because of their current low volume of traffic and the investment costs;
3. They will generate greater environmental and social costs.

5.2.5.3 *Adopted Option*

The project is designed to use the current road alignment as much as possible. The current road is, indeed, straight and flat. It virtually has no slopes to climb or descend, given the relief of the region.

In agreement with the Government and the local authorities, the adopted option follows the current alignment, in order to: (i) connect, to the extent possible, all towns and villages along the project road and improve living conditions for the communities concerned; (ii) reduce

expropriations, the risk of isolation and population displacements to a minimum; and (iii) optimize the cost of building the new road.

To mitigate the negative socio-economic impacts, the volume of affected property was assessed on the basis of two scenarios based on the breadth of the right-of-way: (i) a systematic survey within a 40 m right-of-way of the project road (in open country) for the first scenario; and (ii) a survey within a narrower 10 m right-of-way in built-up areas and 30 m in open country. The objective is, of course, to maintain the maximum number of people on their respective lands.

6. POTENTIAL IMPACT AND MITIGATION/REHABILITATION MEASURES

As in any road construction project, construction works on the Maroua-Bogo-Maga-Pouss road will include routine road construction activities, namely:

- Construction site installations (technical plants, workers' camps);
- Vacation of the rights-of-way and expropriations;
- Transportation of materials and movement of construction machinery;
- Sanitation and drainage works on the road platform;
- Application of the various layers of pavement;
- Construction works on crossing structures (bridges, culverts);
- Opening and operation of quarries and borrow pits;
- Implementation of related support projects, etc.

6.1 Direct Negative Impacts

6.1.1 Construction Site Preparation and Works Phase

6.1.1.1 Biophysical Environment

- **Impact on air quality:** Clearing and earthworks, construction of the roadway and the movement of vehicles on the project road will generate dust, exhaust emissions such as oxides of carbon (CO_x), nitrogen (NO_x) and sulphur (SO_x) as well as fumes, with an increase in greenhouse gas concentrations in the atmosphere. The operation of plants for mixing concrete, crushing aggregate and preparing asphalt produces dust, while the asphalt mixing plant produces fumes that could contain volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) which could endanger the health of workers and local communities. Air pollution may also: (i) reduce the visibility of drivers and cause accidents; and (ii) increase respiratory and eye infections among exposed workers and locals.
- **Impact on the Soil Structure** (compaction, erosion and loss of fertility): Exposed soil may be seriously affected by surface erosion if nothing is done, because it will have little organic material and vegetation to slow the runoff. Furthermore, movements of construction machinery will contribute to soil compaction, especially in and around deviations and access routes to quarries/borrow pits resulting in surface sealing and loss of fertility.
- **Risk of Physical and Chemical Pollution of Waters and Soils:** During the works, hazardous products such as hydrocarbons, lubricants and waste oils may

be accidentally or deliberately spilled on the ground. Meanwhile, some building materials (concrete, lime, bitumen, etc.) can come into contact with seepage water and thus penetrate into and pollute the groundwater. The possible points of impact are the streams of the project area and flood areas (PK 70 to Pk 94 + 700; PK 75 + 900, PK 84 + 800, Pk 91 + 300, Pk 93 + 800, PK 94 + 700). The sensitive areas, as far as soils are concerned, are the garages, hydrocarbons storage areas, bitumen plant, borrow sites, and the environment around the road alignment. Impacts on the health of local communities may also be substantial, given the scarcity of drinking water in the villages. The absence of petrol stations on a significant segment of the project road will force the company to store the fuel for its vehicle fleet and construction machinery. Grease, engine oil, bitumen for paving the road, stripping products, paints for signalling and miscellaneous purposes will also be used on the construction sites.

- **Soil Erosion:** Several project activities may strip the soil surface and expose it to erosion. These include excavation, the opening and operation of quarries, vacation/clearing of the right-of-way, disposal of waste materials, earthworks and laying of the different layers of the road that will create embankment slopes in certain places. This last aspect is all the more disturbing because in flood-prone areas, there is need to raise the road to form a dyke (dyke road). Possible points of impact will be in the dyke road segment: Bogo segment (Pk 32 + 500) - Guirvidig (Pk 69 + 200), deviations, technical plants and workers' camps, quarries, borrow pits, disposal sites, and major embankments.
- **Impact on Wildlife:** Wildlife will be affected by the construction that will disturb their tranquillity, by machinery noise, and by the presence of workers. Furthermore, the road construction staff will definitely indulge in the consumption of wildlife products. Poaching, which is an abiding reality in the area, may intensify with the arrival of workers due to the high demand for animal protein and the lack of butcher's shops in the area. Project workers may also engage in illegal hunting or the distribution of guns and ammunition and other hunting tools to locals. Protected species may then be hunted down. This phenomenon will be particularly significant because the project area clearly has a wide diversity of wildlife. Similarly, poachers may use project vehicles for their own movements or for transportation of caught animals.
- **Impact on Vegetation:** Several activities of the project construction phase are likely to result in destruction of the vegetation cover. These include the general installations of the project site, vacation/clearing of the right-of-way, opening and operation of borrow pits, quarries and provisional deviations. The roadsides are wooded, but the distance from the trees to the road exceeds the breadth of the planned rights-of-way (10 m in urban areas and 15 m in open country). Hence, the loss of vegetation will be minimal and only concern the borrow pits, quarries, workers camps and technical plants. The destruction of flora in borrow pits and quarries will affect an approximate surface area of 2.5 ha. Only about a dozen trees will be felled within the road section.

6.1.1.2 Human Environment

- **Expropriation:** Within the project area, there are 36 persons whose property will be affected in Maga and Maroua III. Field surveys show that persons affected by the project (PAPs) include 2 (two) farmers, 4 (four) stockbreeders and 17 traders. In light of the foregoing, most of the PAPs rely on trade for their livelihood (see the annexed summary abbreviated resettlement plan for more details).
- **Impact on the Health of Workers and Local Communities:** Works execution will require significant mobilization of labour. Companies will go to the field with their senior staff and recruit skilled or unskilled local labour for the execution of labour-intensive tasks. Staff regularly deployed to the project site will comprise representatives of the Administration, control mission staff and construction workers. This massive staff deployment is likely to give rise to cohabitation and ultimately sexual relationships with locals or between staff members. The low enrolment ratio and poverty of the local population point to a risk of sexual promiscuity that could result in unwanted or early pregnancies and increased prevalence of STD/AIDS. The result could be the abandonment of children to single mothers under conditions of poverty and destitution at the end of the project and after departure of the workers.
- **Risk of Conflict:** The temporary presence of project staff in the area could create a cultural melting pot that will be a source of conflicts. Such conflicts could stem from several factors such as: (i) non-respect of local mores and customs; (ii) no communication and awareness-raising campaigns; (iii) failure to comply with compensation procedures for destroyed property and failure to consult roadside communities prior to the implementation of procedures relating to expropriation, opening of deviation paths, etc.
- **Risk of Desecration or Destruction of Cultural and Archaeological Heritage/Sacred Sites:** The sites sacred to project area communities are cemeteries, traditional palaces and places of worship. During the investigation, only one place of worship - the mosque of the Madaka village in PK 25+500 – was identified within the project right-of-way. No cemeteries, Lamidat or Sultanate were identified as likely to be affected by the road alignment. Historically, some villages in the project area have existing for over 400 years. Indeed, the project area could hold some vestiges likely to be destroyed.
- **Impact on Gender and Poverty:** During the works and maintenance phase, approximately 15,000 staff-months of jobs will be created. Approximately 20% of these jobs will be reserved for women. During the works, a certain number of small income-generating activities will develop around the project sites, including restaurants and little shops selling basic necessities, etc.

6.1.4 Operational Phase

6.1.4.1 Physical Environment

- **Impact on Wildlife:** The greatest impact on wildlife during operation of the rehabilitated road will be: (i) risk of accidents with wild animals, especially elephants, and domestic animals (small and large ruminants) crossing or moving along the road; (ii) risk of development of poaching activities due to improved

traffic conditions. The disturbance of wildlife by traffic noise will be limited because animals disturbed by noise are likely to move away from the road.

- **Impact on Vegetation:** The impact will be mainly indirect and cumulative. The operation of the road could have several effects on vegetation such as: (i) the development of new villages near the new road, which could give rise to clearing of the vegetation; (ii) the opening of roads perpendicular to the project road; (iii) increased stripping of the topsoil and slash-and-burn agriculture; (iv) increased wood collection, felling of trees, etc. Lastly, the road could increase anthropogenic pressure on forest resources, driven mainly by the demand for fuelwood, timber, etc.
- **Impact on Water and Soil Resources:** Wearing of the road surface through friction from the steady flow of traffic produces a large quantity of very fine dust particulate. For pavements with a breadth of 7.5 m, the estimated pollutant load is 0.66 kg/m². While the biological oxygen demand (BOD) resulting from such wearing, measured after 5 days (BOD₅), is usually minimal, the chemical oxygen demand (COD) is, however quite high, for high-traffic areas. Although there have hitherto been no reliable values over a long period to determine the extent to which vehicle emissions contribute to the pollution of rain water runoff in urban areas and along the road, this risk remains. The abrasion of brake pads and metallic constituents usually generates inorganic matter containing fairly substantial quantities of heavy metal such as copper, nickel, chrome and lead. Furthermore, poorly managed or ill-disposed solid waste have potential impacts on these resources.
- **Impact on Air:** The materials emitted in gaseous form, including the nitrous oxides (NO, NO₂) amounted to 10 kg/year per vehicle. Unburnt hydrocarbons are 38kg/vehicle annually. Nitrous gases are oxidized in the atmosphere and are partially dissolved by rain. Organic hydrocarbon gas bonds with the dust and is partially absorbed by the rain. Furthermore, improvement of the state of the road will generate greater traffic, thereby increasing, to the same extent, the number of emission sources which are vehicles. Meanwhile, construction of the road will increase the average traffic speed. This will make the traffic more fluid and the emission ratios will generally be lower than those produced at current speeds (air emissions are usually inversely proportional to traffic speed).
- **Impact on Soils:** The impact of the project road on soils, during its operational phase, essentially relates to the risk of erosion, which can be considered as an impact (destruction of the environment through gullyng, clogging, ultimate stripping of the vegetation) but also as a major constraint on the sustainability of the developed roads.

6.1.2.2 Human Environment

- **Risk of traffic accidents:** Commissioning of the road would ease traffic on this route, thereby boosting passenger and freight movements. Moreover, the farming and livestock production in these localities is substantial, thus generating the risk of accidents with animals (large and small ruminants). The greater traffic could increase the frequency of road accidents.

6.2 *Direct Positive Impacts on Poverty and Gender*

The Maroua-Bogo-Pouss road is fairly degraded, thus reducing vehicle speed and hurting goods traffic, with high post-harvest losses. The speed hardly exceeds 40 km/h for goods trucks. The result is traffic flow constraints, with high operating costs due to many potholes and other structural damage to the road surface. Development of this road will: (i) facilitate the transportation of goods (agricultural inputs, agro-pastoral production, etc.) to commercial and consumption centres; (ii) reduce post-harvest losses and thereby increase incomes for farmers and women involved in processing activities; (iii) create new activities in the agricultural sector, especially for highly perishable produce (vegetable, dairy products, etc.). The construction of multifunctional platforms for women, the provision of kits, etc. will boost this positive impact on poverty reduction in the project area.

Paving the road will lead to the redeployment of socio-economic activities, such as eco-tourism, because tourism sites will be more accessible to tourists. Boosting this sector will mainly benefit the local youths and help create jobs.

The economic benefits reaped by the community include: (i) endogenous benefits related to a reduction in vehicle operation costs (VOC); road maintenance gains; reduced travel time; and the residual value of the highway at project completion; and (ii) exogenous benefits related to agricultural and agro-pastoral surpluses produced by local communities; an increase in the agricultural produce marketed by the PA; and an increase in the sales value of agricultural products processed locally.

6.3 *Impact Associated with Maintenance Activities*

Maintenance work will be done using the GENIS method and will create jobs, albeit on a smaller scale relative to the construction phase.

6.4 *Cumulative Impact*

The current or future projects in the region are the following: (i) paving of the Maroua-Mora road; (ii) paving of the Dabanga-Kousseri road; and (iii) SODECOTON whose main goal is the development of cotton production and any crop that can be grown in rotation with cotton, and processing of these products into lint, (soybean and cotton) oil and animal feed; (iii) the nautical station of Maga; and (iv) the Flood Emergency Project (PULCI).

It is highly likely that these projects interact with the Maroua - Bogo - Pouss road project to generate a significant number of cumulative impacts, both positive and negative. Positive cumulative impacts will include improving the living conditions and quality of life of the people and increasing business opportunities, thanks to merchandise from various sectors of the economy. Furthermore, the implementation of these projects will generate the need for workers, and thus jobs. The negative impacts include an increase in STD/HIV-AIDS due to the intermingling of workers from various backgrounds and customs with the local population and an increase in food needs owing to the presence and concentration of workers. There will also be a cumulative impact in terms of anthropogenic pressure on natural resources, especially the forest and wildlife. The surge in traffic during the works and operational phases could increase the risk of accidents with domestic and wild animals, as well as human beings.

Previous road maintenance works on the current segment opened up many borrow pits that have not yet been rehabilitated. Similarly, the works could generate waste that would scar the project area landscape if not well managed.

6.5 Mitigation/Rehabilitation and Monitoring Measures Anticipated at this Stage

6.5.1 Normative and Administrative Measures

These measures entail ensuring project implementation compliance with the applicable administrative and contractual regulations, in particular:

- ***Compliance with Environmental and Social Regulations:*** Project implementation should comply with the applicable environmental regulations of the country and the AfDB. To that end, the ESIA report was submitted for consideration by MINEPDED. A letter of confirmation of the use of national procedures for review and approval was issued by MINEPDED.
- ***Compliance with Land Regulations:*** Since the project requires expropriation, the resettlement plan should be consistent with the land regulations in force in Cameroon. These regulations are included in the Abbreviated Resettlement Plan (ARP) prepared as a separate document.
- ***Selection and Commissioning of Contractors:*** The environmental and social clauses will be included in the bidding documents (BDs). The environmental component of the rules of procedure for construction sites will also be prepared to mainstream environmental considerations into the practices of the company and the behaviour of its workers (consumption of bush meat, alcohol consumption during working hours, non-compliance with hygiene rules, etc.). The recruitment of an Environmental Officer for the company will be mandatory.
- ***Establishment of a Committee for Hygiene, Safety and the Environment at Work:*** The officer's role shall be to ensure the hygiene, safety and protection of the work environment. He/she shall also sensitize workers on environmental issues and ensure their involvement in the implementation of environmental measures.
- ***Fair, equitable and prior compensation*** to PAPs for all property identified in the Abbreviated Resettlement Plan (ARP). The budget, including all measures adopted under this plan, as well as the implementation and monitoring/evaluation costs of the operation, amounts to CFAF 67 million. This amount will be paid by the Government of Cameroon prior to the commencement of works on the road section concerned.
- ***Commitments and Deliverables of the Contractor:*** The works contract will institute a quality assurance plan (QAP) including environmental protection clauses with which it undertakes to comply. It will be recommended that each contractor for each lot should submit an environmental protection plan for the site (EPPS) and a worksite environmental management plan (WEMP) within 60 days after notification of the contract to the inspection firm's environmental officer for approval. These documents should at least indicate: (i) the organizational structure of the staff assigned to environmental and social management, indicating the environmental and social officer of the project; (ii) a description of the methods to

be used to reduce impacts on the biophysical and socio-economic environment; (iii) the management and rehabilitation plan for borrow pits and quarries, including management of explosives; (iv) the water resources management plan; (v) management plan for erosion, drainage and sedimentation; (vi) installation plan for the workers' camp, indicating storage areas and equipment locations; (vii) solid and liquid waste management plan; (viii) all site protection measures and implementation programme; (viii) location and general plan of the site, drawn to scale; (ix) description of the methods proposed to avoid and reduce pollution, fires, road accidents; (x) health infrastructure and community access in case of an emergency; (xi) construction site regulations governing environmental protection and safety; and (x) the proposed plan for developing the site at works completion and handing over any wells to the local population.

6.5.2 *Construction Phase*

6.5.2.1 *Physical Environment*

- **Air Quality Protection Measures:** The contractor must take all necessary measures to avoid sullyng the worksite, road surface, road shoulders and sidewalks with dust, excavated material, mud or other material resulting from the works. The SEPP of the enterprise contains all these measures and will be approved by the inspection firm and MINTP prior to commencement of works and monitored by the same entities during the works. Air, which is the affected component, is protected by Article 21 of Law No. 96/12 of 5 August 1996: Framework Law on Environmental Management and its implementing Decree No. 2011/2582/PM of 23 August 2011 to define the terms of atmospheric protection.
- **Protection of Water Resources and Soils:** The protection of surface and groundwater, as well as soils, against pollution will be done mainly by prohibiting the disposal of wastewater, mud, grout and all other types of pollutants into wells, boreholes, groundwater, water courses, natural streams, ditches or even on the bare ground. Furthermore, workers' camps must also have adequate facilities (septic tanks, pumps with adequate fuel, etc.). To mitigate the impact on watercourses, the following measures should be taken: (i) prepare a waste management protocol; (ii) avoid any disposal of materials (leftover concrete, rubble, scrap, etc.) and waste into streams; (iii) restore the flow of watercourses at project completion; (iv) protect slopes through grass seeding or riprap masonry; (v) open up areas for disposal of waste materials at a distance of at least 50 metres; (vi) provide a concreted area for washing of vehicles and machinery, equipped with an oil-water separator; (vii) build a covered, watertight tank for storage of hydrocarbons; (viii) provide on-site labelled bins with lids for different types of waste; (ix) sign a contract for the recycling and treatment of waste oils, filters, iron, batteries and other non-biodegradable wastes with a company that has an environmental permit.
- **Fauna and Flora Conservation Measures:** Actions will be taken at 3 levels. **At the worksite:** (i) Control and sensitize staff on the problem of poaching, and prohibit the consumption of bush meat in workers' camps; (ii) supply the canteen in workers' camps with fish and meat from local livestock as a source of protein; (iii) install speed bumps and road signs at wildlife (especially elephants)

crossings; and (iv) strengthen surveillance by water and forestry officers during the works. There are also plans to: (i) prohibit unauthorized sawing of wood, and get wood supplies for works only from certified companies; (ii) install technical plants only in areas that are already anthropized or integrate them into natural landscapes; and (iii) plant trees to restore destroyed habitats (6 ha) and protect elephant migration corridors. **Within the communities**, an NGO specialized in environmental protection will raise awareness on specific topics such as bush fire control and ensure knowledge of local protected species by pupils and students. **At the institutional level**, this would entail: (i) providing specific support in the form of equipment and assistance to restore the corridors; (ii) providing MINFOF services with anti-poaching equipment; (iii) supporting the monitoring of water resources and forests; (iv) training the staff from divisional services and from the forestry and hunting posts involved in wildlife geolocation; and (v) contributing through participation in awareness-raising.

- **Measures to Mitigate the Impact on the Landscape:** To mitigate the effects of extraction on the landscape, it is appropriate to: (i) choose invisible attack points of the road, and gradually clear the site as the operation progresses; (ii) limit and guide the works in order to execute a "hollow tooth" operation; develop quarry surroundings (site entrance, access road entrance) with topsoil and plant. To reduce destruction of the existing vegetation, the terms of reference for companies should: (i) limit the felling of trees to a minimum on the various work sites; (ii) hand over felled trees to the local community to use as firewood and thus limit the pressure on forest resources; (iii) rehabilitate degraded areas (technical plants/workers' camps, borrow pits, quarries and others) after works completion; and (iv) rehabilitate degraded land by reforesting mangrove areas. The contracting authority should fund a reforestation programme to accompany the project.

To reduce the scale of poaching, the following measures are recommended: (i) include in the rules of procedure for construction sites, a ban on the consumption or transportation of game by construction workers and impose penalties for offenders; (ii) sensitize the staff and local communities on wildlife protection; and (iii) prohibit the sale of bush meat to women selling food on the construction sites.

6.5.2.2 Human Environment

- **Compensation:** Monitoring of ARP implementation and the operation of the Disputes Settlement Committee. Considering that submission of evidence of compensation is a condition precedent to the commencement of works on this section, it is important to ensure optimal ARP implementation.
- **Access to Local Communities and Sustainability of the Road:** Develop definitive access routes for locals, that lead to the structures located along the road and into access ramps and secondary roads.
- **Raise Awareness on Road Safety and Environmental Protection:** An NGO or other specialized structures will take care of this activity, preferably one month prior to commencement of works, during the entire construction period, and one month after the end of construction works. It will sensitize local residents, workers and road users on: (i) health problems (STI/HIV-AIDS); (ii) road safety

and protection of the project road; and (iii) environmental protection, including sensitization of pupils and students on protected species, and of the population on bush fire control.

- **Preventive Measures on Human Safety:** To ensure the safety of its workers, the local population and road users, the company must take all precautions to prevent any risk of accident: road accidents, fires, explosions, mishandling of the construction equipment, etc. All recommendations on the preservation of human safety during the works focus on signalling, access control, awareness-raising, fire prevention and related facilities. To that end, an awareness campaign will be conducted by a specialized NGO (see above).
- **Cultural Heritage Protection Measures:** Apart from a mosque, no property or cultural site will be directly affected. This notwithstanding, and in addition to the proposed mitigation measures, the environmental and social clauses will relate to the accidental discovery procedure, in accordance with the laws and regulations governing cultural heritage and antiquities in Cameroon. Other plans relate to: (i) holding consultations with the relevant religious authorities; (ii) training workers responsible for the earthworks (equipment operators and assistants) and those in charge of archaeological monitoring works; and (iv) conducting archaeological monitoring during excavation works (road, workers' camps and technical plants). Lastly, there are plans to prepare and disseminate a protocol on the collection of samples or archaeological remains on the worksite.
- **Measures for vulnerable communities:** Field investigations led to the identification of 1 (one) widow and 6 (six) single women as vulnerable persons who are well integrated into their community. Such integration notwithstanding, specific measures will be taken to lend special assistance to these vulnerable persons in accordance with the ARP. This will comprise: (i) assistance during the compensation procedure (e.g. provide further explanations on the process and the types of compensation envisaged; ensure that documents are disseminated and understood by all); (ii) assistance in the period following payment to ensure that the compensation is secure; (iii) assistance during the period following resettlement; (v) medical assistance, if necessary, at critical periods, particularly during the displacement and transition that follow immediately after the move; and (vi) assistance in making any requests.

6.5.3 *Road Operation Phase*

- **Road Safety Measures:** Special care is given to road sections that run through towns and villages and are dangerous points for both road users and local communities (road signs, speed bumps, 2-metre wide sidewalks, expansion of road shoulders, parking areas in all villages, protective facilities near schools, etc.).
- **Community Awareness-raising:** Community awareness-raising will continue during the first months of commissioning, and will focus on environmental protection, road safety and HIV/AIDS.

7. RESIDUAL EFFECTS AND ENVIRONMENTAL RISK MANAGEMENT

7.1 *Negative Residual Effects*

No average or significant negative residual impact is expected after the application of mitigation measures. The negative residual impacts are minor and are not subject to specific measures.

7.2 *Environmental Risk*

The environmental risk will mainly relate to the accidental spillage of hydrocarbons, bituminous products, explosives and other substances used for road construction. Several types of waste will be produced on the Maroua-Bogo-Pouss road construction, which can be categorized as follows: (i) inert waste - mainly concrete, soil from earthworks, rubble (tile, brick, plaster, sand from the demolitions, etc.); (ii) non-hazardous waste (wood, plastics, paper and cardboard, ferrous and non-ferrous metals, tapestries, carpets, plants, glass, electrical wires and cables, PVC pipes, tyres, etc.); and (iii) hazardous waste (paint, mastic, varnish, sprays, asbestos, contaminated packaging, tar, solvents, oils, and glues).

An emergency response plan will be implemented, and it will cover the management of waste and effluents, including accidental spills. The main objectives of this plan are to: (i) protect the environment - recycling of waste generates significant savings in natural resources and limits pollution resulting from burial of waste or open dumps; (ii) generate savings for the project - proper on-site waste management greatly reduces the costs of waste disposal; and (iii) reduce construction site pollution. Proper waste management helps to: (i) reduce the visual impact and dispersal of waste and dust; and (v) improve working conditions on the site. A tidy construction site without any litter leads to improvement of working conditions, reduces the hardship of certain tasks, and increases output.

The other measures concern: sensitization and training of worksite employees and *ad hoc* teams on rapid response techniques in case of disaster, safety measures to be observed in hazardous or high-risk areas, and sensitization of local communities on health risks prevention and road safety. All these measures will be detailed in the documents to be submitted by the company and approved by the inspection firm prior to the commencement of works, namely: (i) the waste management plan; (ii) all site protection measures with their implementation schedule; (vii) the methods for preventing and reducing pollution, fires, and road accidents; (viii) the health infrastructure and community access in case of emergency; and (ix) construction site regulations pertaining to environmental protection and safety.

The operation of plants for mixing concrete, crushing aggregate and preparing asphalt produces dust, while the asphalt mixing plant produces fumes that could contain volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) which may harm the health of workers and local communities. To that end, the various permits must be obtained to ensure compliance with the different standards. This is particularly the case with the risk analysis required by the Ministry of Mines, Industry and Technological Development (MINIMIDT).

8. MONITORING PROGRAMME AND INSTITUTIONAL RESPONSIBILITIES

8.4 *Monitoring Objectives and Content*

The overall goal of environmental monitoring is to ensure effective implementation of environmental measures. Its main objectives are to: (i) enforce the current laws, regulations and policies within the relevant services; (ii) comply with government directives on the guidelines outlined in the environmental and social impact assessment report; (iii) submit an environmental assessment in the event of impacts not predicted by the ESIA, and propose adequate solutions; (iv) enable the promoter to promptly react to the failure of a proposed mitigation measure or any other unexpected environmental disturbance; and (v) apply sanctions and penalties as stipulated in the various contracts signed between the promoter and third parties.

To ensure good environmental monitoring of the project, the steps to follow are: (i) prepare the monitoring programme; (ii) define the operations to be inspected; (iii) identify and locate sites to be monitored; and (iv) list and understand the environmental measures proposed in the Environmental and Social Impact Assessment (ESIA).

8.2 *Operations Requiring Monitoring*

The operations that will require environmental monitoring generally include:

- compliance with the environmental regulations of the construction site;
- erection of mobile and/or fixed signs near sensitive areas (work sites and built-up areas, etc.);
- control of the management of disposal sites for waste material (sewage sludge, excavation material, etc.);
- operation and rehabilitation of borrow pits, workers' camps, and plant sites;
- compliance with STD/AIDS prevention measures;
- compensation for damaged property and crops;
- wearing of personal protective equipment by the appropriate staff; and
- recovery of waste oils and all other hazardous waste.

8.5 *Surveillance and Monitoring Stakeholders*

Environmental Officer of the Company: The environmental officer of the company will be responsible for the implementation of certain measures, but will remain the primary official who ensures environmental monitoring of such measures. Indeed, although the environmental officers of companies implement certain environmental measures, they are the primary officials

responsible for monitoring the implementation of several other measures that will usually be implemented by site managers, garage heads and others.

Environmental officer of the Inspection Mission: The environmental officers of inspection missions will be the main agents of environmental monitoring. Their role will be to ensure proper implementation of the environmental measures. To succeed, they must work closely with their counterparts in the works companies.

MINTP's Infrastructure Environment Protection Unit (CPEI): The CPEI will supervise environmental monitoring through monthly field trips and/or monthly meetings chaired by the Head of the Procurement Service. It will also be responsible for receiving and reviewing bi-annual reports prepared by the Inspection Mission before they are forwarded to the Ministry of the Environment, Protection of Nature and Sustainable Development (MINEPDED), in accordance with the regulations in force.

During the Bank preparation mission, MINEPDED recommended that an Environmentalist in the Central Services, that is MINEPDED's ESMP Monitoring Sub-department, should be appointed to monitor implementation of the project's ESMP, since the project concerns more than two regions of Cameroon. Notwithstanding monitoring at central level, the Divisional Delegations of MINEPDED and the Ministry of Forestry and Wildlife (MINFOF) which has jurisdiction over forestry, wildlife and nature conservation, will be involved in monitoring, in accordance with Decree No. 2013/171/PM of 14 February 2013. At the practical level, a monitoring committee comprising representatives of the main Ministries, alongside representatives of other services depending on the issues to be discussed, has been established.

Local Population: The environmental monitoring role of the population living along the road will be to ensure that the scheduled environmental measures are properly implemented. The local population has to participate in environmental surveillance to ensure that project activities do not degrade their living environment. To that end, they should know their rights and duties, and all the environmental guidelines to be observed in order to avoid making unfounded claims that may lead to conflicts. **They should, as much as possible, report any failure to comply with the proposed measures and those which are not properly implemented.**

8.4 Monitoring Tools

To succeed in their surveillance missions, the inspection mission environmental officers will design appropriate environmental surveillance tools, in particular:

- environmental identification form (FIE);
- indicator form;
- environmental logbook;
- preventive action form;
- reports of sensitization meetings;
- environmental non-compliance form; and
- correspondence.

8.5 Monitoring Indicators

At the administrative level, the monitoring indicators will be measured by Environmental Officers from the inspection mission and the MINTP Environmental Unit.

Recruitment of an Environmental and Social Affairs Officer for the Company

- Employment contract of the Environmental and Social Affairs Officer;
- Effective on-site presence of the Environmental and Social Affairs Officer;
- Payslips or payment records of the Environmental and Social Affairs Officer.

Establishment of a Work Hygiene, Safety and Environment Committee (CHSET)

- Existence of a memorandum to establish the CHSET;
- Operating resources of CHSET available;
- CHSET action plan.

Drafting of the Environmental Component of the Internal Regulations of the Construction Site

- Existence of the environmental component of the internal regulations for the construction site;
- Existence of an internal regulations discharge form.

The other indicators below will be monitored by the ESOs of the company and the inspection mission, working in close collaboration with the other stakeholders concerned.

Management of Construction Waste and Protection of Watercourses and the Landscape

- Preservation of the air quality and reduction of GHG emissions;
- Technical inspection forms for vehicles and machinery;
- Maintenance forms for vehicles and machinery;
- Number of trees felled and placed at the disposal of the population;
- Contracts with a waste collection and treatment company that has an environmental permit;
- Manifests of waste received for recycling by specialized companies;
- Existence of covered and sealed containers for storage of hydrocarbons;
- Existence of a waste management plan;
- Existence of labelled bins containing different types of waste;
- Existence of a concrete area for washing of vehicles and machinery, equipped with an oil-

- water separator;
- Existence of degraded areas that have been rehabilitated; and
- Distance between project facilities (workers' camps and technical plants) and water bodies.

Biodiversity Conservation

- Service contract for planting trees;
- Existence of timber from felled trees, given to the local population;
- Existence of speed bumps on at least 3 kilometres on both sides of elephant crossings;
- Existence of road signs at crossing points for elephants and cattle;
- Existence of trees planted along the migratory corridors of elephants;
- Number of nursery experts trained;
- Number of seedlings planted by the local community; and
- Survival rate of planted seedlings.

Traffic Facilitation, Prevention of Road Accidents, and Protection of the Road Infrastructure

- Existence of provisional access walkways for the local population during the works;
- Existence of paved access routes for the local population;
- Existence of safe zones on the construction site;
- Existence of construction site signs;
- Presence of speed bumps at accident-prone locations;
- Number of fines for overloading of project vehicles;
- Existence of a divisional brigade for regular maintenance of the paved road; and
- Existence of work equipment for public advisory committees.

Protection of Workers, Local Population, Road Users and Property

- Existence of a round-the-clock security service, including the armed forces;

- Existence of a register for signing out work equipment;
- Number of workers trained in first aid;
- Existence of work equipment issued to public advisory committees;
- Frequency of PPE renewal;
- Existence of soundproofed power generators;
- Existence of a contract for the occupational physician;
- Number of workers registered with CNPS (certificate of registration and document showing payment of workers' contributions); and
- Distance between quarries and homes.

8.5 Reports

Quarterly environmental and social surveillance reports will be prepared by the inspection mission environmental officers. The reports should summarize their activities and the difficulties encountered, and be submitted to AfDB.

Half-yearly reports should be submitted to MINEPDED (Article 27(3) of Decree No. 2013/171/PM of 14 February 2013 defining conditions for conducting environmental and social impact assessments). Following the opinion of the Inter-Ministerial Committee on the Environment, MINEPDED may adopt remedial or additional measures to reflect impacts not initially or insufficiently assessed in the ESIA.

9. PUBLIC CONSULTATION AND INFORMATION DISSEMINATION

Public consultation in Cameroon is governed by Article 11 of Decree No. 2005/577/PM of 25 February 2005. Accordingly, the stakeholders concerned were consulted during the conduct of the ESIA in March and April 2016. Some 5 (five) public consultation meetings were held both with the entire population and with persons affected by the project.

9.1 Public Consultations with the Entire Population

Of the five meetings, three brought together the entire population of the villages along the project road. They were held on 5 and 6 April 2016 in Maroua III City Hall, Bogo City Hall and Maga Subdivisional Office. They were attended by the subdivisional officers, village chiefs, elders, the public, and the assessment team composed of MINTP and CARFAD staff.

9.2 Public Consultations with Persons Affected by the Project (PAPs)

The other two public consultation meetings brought together persons affected by the project (PAPs) on 5 and 6 April 2016 in Maroua III Town Hall and Maga Subdivisional Office. Apart from the assessment team members (MINTP and CARFAD), the other participants at these various meetings were the competent subdivisional officers, village chiefs, elders and the persons affected by the project.

Meeting Dates	Villages Concerned	Venue	Number of Participants
05/04/2016	KODEK, BALAZA LAWAL, BALAZA LAMIDO	Maroua III Town Hall	52
06/04/2016	GUIRVIDIG, MAGA, POUSS	Maga Subdivisional Office	50
06/04/2016	MADAKA, BONGORNO BOGO, MABOUMAI, MATAKAMBE	Main hall of Bogo Mayor's Office	63

The objective of these consultations with PAPs was to: (i) reiterate the regulatory context of public consultations during conduct of the ESIA; (ii) present the legislative and regulatory framework for involuntary displacement or expropriation; and (iii) discuss expropriation procedures/envisaged package solutions/compensation.

Consultations were conducted in the respective town halls for Maroua III and Bogo, and in the Subdivisional Office for Maga. All the consultation meetings were chaired by the territorially competent Subdivisional Officer, and they brought together approximately 60 participants, including traditional, community and religious leaders, as well as PAPs (traders, farmers, etc.).

9.6 Outcomes of ESIA Public Consultations

The concerns raised by participants included: (i) risk of increase in road accidents; (ii) increase of HIV-AIDS and other diseases; (iii) risk of property loss; (iv) risk of isolation for some villages; (v) risk of loss of ecological resources (animals scared off from the region, loss of trees, etc.); (vii) risk of developing respiratory diseases because of the dust; and (viii) risk of development of insecurity.

The participants suggested the following mitigation measures: (i) install speed limit signs along the road; (ii) educate users on compliance with the highway code; (iii) build speed bumps at the entrance to schools, markets and integrated health centres (IHCs); (iv) avoid disorderly road occupancy; (iv) avoid drying foodstuff on sidewalks; (v) sensitize drivers on the dangers of speeding; (vii) educate the local population and workers on these diseases; (vii) compensate property owners; (viii) build access roads to isolated villages; (ix) plant trees to replace those felled; (x) water the road during the works; and (xi) support the public advisory committees.

Many complaints were made about the need to: (i) build speed bumps and fences for schools, IHCs and markets; (ii) construct wells equipped with manually-operated pumps (MOPs) in schools and IHCs; (iii) rehabilitate the road apron at the exit of Bogo that leads to Maga; (iv) support women's associations and CIGs of Maga to develop economic activities; (v) build side channels to direct water towards the outfalls and *mayos*; and (vi) build embankments to raise the road and facilitate the flow of runoff water.

Almost all these concerns were factored into the design of the road and related facilities/measures that the programme will develop. The participants were informed that the complaints will be ranked in order of priority and, depending on the budget available for related facilities, a certain number of them will be addressed. Accordingly, they have been ranked as follows: (i) rehabilitation of rural roads; (ii) rehabilitation of classrooms; (iii) rehabilitation and equipment of the Family and Women's Empowerment Centres (CPFF); (iv) construction and

equipment of Multipurpose Youth Centres; (v) rehabilitation and equipment of health facilities; (vi) construction of pump-operated wells; and (vii) support to women's groups.

9.7 *Outcomes of the Public Consultations with PAPs*

The PAPs consulted were 38 in number, comprising: traditional, community and religious leaders; traders, farmers, stockbreeders, CIG members, students and some elites. The main concerns of the PAPs relate to compensation for the property that will be destroyed, and assistance to PAPs during implementation of the compensation procedures.

Further explanations were given on the expropriation procedure and payment of compensation arising from expropriation for public purposes. It was clarified that expropriation for public purposes and compensation are governed by numerous legislative texts, including: (i) Law No. 85/09 of 4 July 1985 on expropriation for public purposes and conditions for compensation; (ii) Decree No. 87/1872 of 16 December 1987 to enforce the abovementioned law; (iii) Decree No. 2003/418/PM of 25 February 2003 to determine the compensation rates to be paid to persons whose property has been expropriated for public purposes, as regards crops and cultivated trees; (iv) Decree No. 2014/3211/PM of 29 September 2014 to determine the minimum price for land that is the private property of the State; (v) Order No. 00832/T.15.1/MINUH/D00 defining the basis for determining the commercial value of buildings expropriated for public purposes. Copies of these instruments were disseminated to the public to enhance their understanding of the facts.

The main suggestions of the PAPs essentially focus on the following: (i) payment of compensation for displacement of mosques should be organized jointly with worship and traditional leaders; (ii) compensation for expropriation must be in cash only and be at least of equivalent value with the expropriated infrastructure. The team leading the public consultations provided the necessary clarifications. Furthermore, most of the concerns are factored into the ARP. Others, such as those relating to the reconstruction of community infrastructure and facilities are addressed under related infrastructure.

9.5 *Future Consultations*

Article 20 (2) of Decree No. 2013/0171/PM of 14 February 2013 defining the conditions for conducting environmental and social assessments, sets out the terms for public participation in the conduct of the study. Unfortunately, there are no provisions governing public participation in the project implementation phase. However, the participatory approach and public consultation process is expected to continue during project appraisal and implementation, mainly to: (i) validate the resettlement plan; (ii) establish the worksites and start construction; and (iii) establish the baseline situation and ensure monitoring and evaluation of project impacts. The consultations should allow for implementation of the measures recommended in the Environmental and Social Management Plan (ESMP).

Community participation will entail: (i) working with the team responsible for listing the property to be compensated; (ii) participating in awareness meetings: Each participant must not only receive the awareness messages but also pass them on to their family members; (iii) resorting to normal channels when offended (environmental officer of the monitoring mission, police, etc.) rather than taking the law into their own hands by obstructing the execution of project activities; (iv) reporting all environmental violations observed during works execution; (v) setting up environmental and road protection committees; (vii) participating in road maintenance works through environmental and road protection committees.

Civil society may get involved in the implementation of the project's Environmental and Social Management Plan by: (i) participating in the implementation of measures: It has been rightly recommended that awareness-raising actions be entrusted to a civil society organization; and (ii) participating in independent environmental monitoring: In this regard, civil society organizations must organize themselves to serve as the interface between the population and the project and to report environmental violations observed in works execution.

This statement will be posted on the Bank's website and will supplement the one that has already been posted concerning rehabilitation of the Yaounde – Bafoussam-Babadjou section:

- for the ESIA (<http://www.afdb.org/en/documents/document/cameroon-transport-sector-support-programme-phase-2-yaounde-bamenda-road-section-summary-esia-11-2015-84550/>) and;
- for the ARP (<http://www.afdb.org/en/documents/document/cameroon-transport-sector-support-programme-phase-2-yaounde-bamenda-road-section-summary-arap-11-2015-84549/>).

9.8 Disclosure of ESIA Reports at National Level

The ESIA findings were disclosed within the project area. The procedure has been initiated and the report is being reviewed by the Ministry of the Environment for validation.

10. SUMMARY COSTS OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Table 7 below presents the summary costs of the project's environmental and social measures estimated at CFAF 794 million.

*Table 7
Summary Costs of the Environmental and Social Measures*

ENVIRONMENTAL AND SOCIAL MEASURES	Costs (CFA.F)
Annual remuneration of the company's Environmental and Social Affairs Officer	Memorandum Item
Establishment of a Work Hygiene, Safety and Environment Committee (CHSET)	Memorandum Item
Drafting of the Environmental Component of the Internal Regulations of the Construction Site	Memorandum Item
Preservation of air quality and reduction of GHG emissions	Memorandum Item
Management of Construction Waste and Protection of Watercourses and the Landscape	Memorandum Item
Compensation for property to be destroyed	67,001,950
Protection of biodiversity and mitigation of climate change	124,000,000
Traffic facilitation, prevention of road accidents, and protection of the road infrastructure	PM
Protection of workers, local population, road users and property	2,200,000
Conflict prevention/management	PM
Awareness-raising	155,500,000
Protection of the cultural and archaeological heritage	3,500,000
Capacity building for MINTP staff in the environmental management of projects	32,460,000
Capacity building for members of the ESMP Monitoring Committee	36,430,000
Protection of pupils and schools	185,400,000
Development of markets and provision of equipment to the population for transportation and processing of agricultural produce	101,520,000
Monitoring by the Infrastructure Environment Protection Unit	12,000,000
Monitored by MINEPDED	4,000,000
TOTAL	794,011,950

Source: ESIA report

11. CLIMATE CHANGE

11.1 Main Challenges

At National Level

According to the National Communication on Climate Change (2005), the areas considered to be vulnerable to climate change are the coastal and Sahel zones. The most significant adverse impacts are expected in the agricultural and livestock sectors in the Sudano-Sahel region, such as in the Maroua-Bogo-Pouss road section.

As regards climate change, Cameroon's intended nationally determined contribution (INDC) under COP 21 is to reduce its carbon footprint by 32% before 2035. Once the Paris Agreement has been signed and ratified, the INDC will become a reference mechanism for the country. To deal with climate change, the Cameroonian Government has created a Climate Change Observatory and intends to revive "Operation Green Sahel", among other actions.

In the Project Area

Based on the vulnerability analysis conducted by the Bank's climate safeguards system, the project has been classified in category 2. This road section is characterized by:

- A high concentration of rainfall exceeding 200 mm in July and August. The intensity of storms causes flooding during these two months and certain sections of the current road are flooded because of the low-lying road surface and the lack of drainage culverts, thus making traffic movements extremely difficult.
- The project area is plagued by droughts, which cause significant loss of pasture in some years.
- **Greenhouse gas emissions:** Improvement of the state of the road will generate slightly more traffic (3% per year), thereby increasing, to the same extent, the number of emission sources which are vehicles.

11.2 Adaptation

On the basis of the AREP tool (manual version), the options applicable to the project include: (i) adapting the design of new infrastructure to enhance climate resilience, including raising roads above water, increasing the capacity of drainage structures, etc.; (ii) monitoring and cleaning the structures; and (iii) building the capacity of the stakeholders concerned.

The project has integrated these aspects as follows:

- Raising the road above water in the road sections concerned (Maroua-Bogo) over a distance of 39 km (the cost is included in the roadworks budget);
- Longitudinal drainage: To avoid gullyng, earth ditches were used for flow speeds of up to 1.5 m/s, which corresponds to a longitudinal slope of 1.8%. For steeper slopes, concreted ditches will be used. Wherever the road passes through villages, provision is made for trapezoidal ditches built of masonry (their cost is included in the roadworks budget);
- The construction of wells to tap groundwater and the development of pastoral wells on both sides of the road (the cost is included in the budget for related infrastructure). A total of ten (10) wells and two (2) mini DWS facilities have been planned under this project.

Moreover, the control of runoff water is critical to the sustainability of the road. Such control starts with the development of drainage structures, but especially their maintenance in a state of regular operation.

11.3 Mitigation

The decision to pave this road section compared to the others was dictated in part by the fact that it is the shortest route connecting Maroua to Pouss. This action optimizes travel and is consistent with the spirit of mitigation: avoid superfluous travel, change of mode of transport, and more efficient means of transport.

Construction of the road will increase the average traffic speed. This will make the traffic more fluid, and the emission ratios will generally be lower than those produced at current speeds (gas emissions are usually inversely proportional to traffic speed). To offset losses in carbon sequestration potential due to destruction of the vegetation (2.5 ha), compensatory reforestation/rehabilitation has been planned for 12 ha, including for protection of the elephant migration corridors.

11.4 Monitoring

Monitoring will be executed in three stages:

- ***During the works:*** Monitoring will be conducted by MINTP's Environmental Unit through the Monitoring Committee whose membership includes representatives from MINEPDED and MINFOF. The tasks of this Committee are programmed in such a way that they coincide with construction site meetings. Monitoring costs during the construction phase, including monitoring of tree planting, will be borne by MINTP.
- ***During the guarantee period:*** This phase is critical for the germination of seedlings. Monitoring will still be conducted by the Monitoring Committee, every 4 months. At the end of this phase, an assessment report will be prepared by each service, including MINEPDED and MINFOF.
- ***After the guarantee period:*** After this period, the services concerned will take over within the context of their assigned duties. In that regard, the monitoring cost will be factored into the operating costs of the services concerned.

12. INSTITUTIONAL CAPACITIES AND STRENGTHENING PLAN

Provision is made for building the capacity of staff from the MINTP Environmental Unit. These include: (i) the network control environmental officer concerned; (ii) the Head of the Infrastructure Environment Protection Unit; and (iii) members of the divisional ESMP Monitoring Committee. On an indicative basis, such capacity building will focus on: (i) general notions on the environment; (ii) conventions on the environment; (iii) institutional and regulatory framework for environmental management in Cameroon; (iv) procedures for conducting impact assessments and environmental audits in Cameroon; (v) environmental impacts of the project and proposed environmental measures; (vi) environmental and social monitoring of road projects; (vii) environmental and social monitoring procedures of the project; and (viii) monitoring of climate change adaptation measures by the consultant engineer.

13. CONCLUSION

The second transport sector support programme on the Maroua-Bogo-Pouss road section, as presented in this study, will have significant negative impacts on the environment, which ought to be mitigated or controlled, as appropriate. The probable negative impact of the project during the construction and operational phases essentially range from moderate to significant. If the proposed measures and abovementioned recommendations are taken into account, this would enable the various components of the project to be integrated harmoniously into their respective environments and ensure the project's viability from the environmental and social standpoints.

4. REFERENCES AND CONTACTS

References

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MINEP, 2008. Guide for Conducting and Evaluating Environmental Impact Assessments in Cameroon, Ministry of Environment and Nature Protection;

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