225 KV GUINEA-MALI INTERCONNECTION PROJECT
LINE ROUTE AND
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENTS

Environmental and Social Impact Assessment
Mali Section

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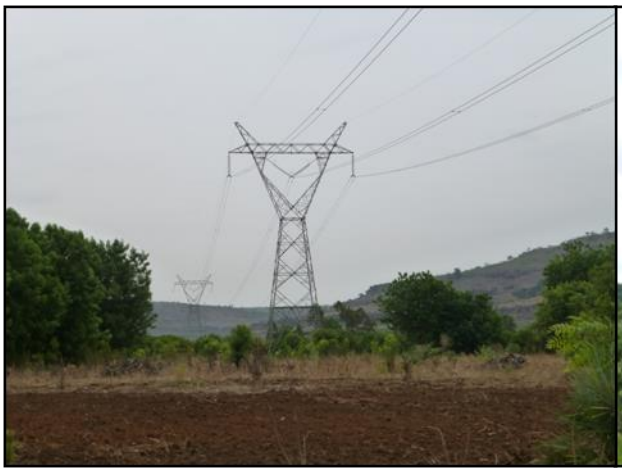

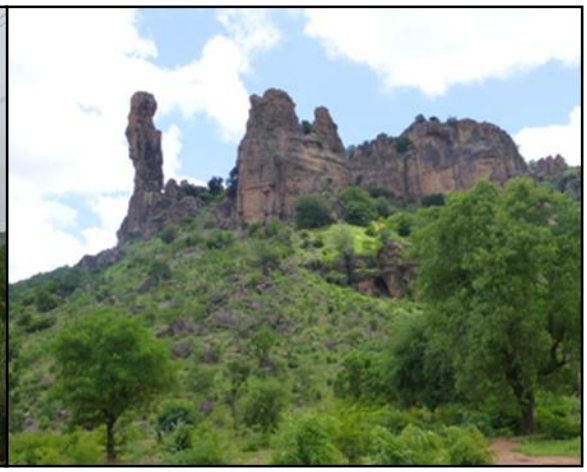

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1. SUMMARY

Introduction

Through the West African Electric Power Pool, ECOWAS promotes and develops power generation and transmission infrastructures in partnership with the national systems of member states. To integrate the operations and usage of national power networks into a unified regional market, the Guinean government has received a grant, and the Malian government a loan, from the African Development Fund (ADF) to finance the line route study for the 225 kV Guinea-Mali Interconnection as well as the assessment of its environmental and social impact.

The main objectives of the Environmental and Social Impact Assessment are to:

- **Comply with the legal obligations** of Mali in order to obtain the environmental permit issued from the Minister of Environment.
- **Meet national and international standards** to implement the power infrastructure construction project
- **Assist project planning and the implementation of these different phases** in order to minimize the environmental, social and economic impact.
- **Help optimize the power transmission component** of the 225 kV Guinea-Mali Interconnection project by reducing or eliminating environmental and social impacts caused by the installation of the power line and related infrastructure while maximizing the positive impacts.

Project description and Rationale:

Study Area:

The study focused on the 127.6 kilometers of line to be built between Dioula Fondou (Mali border) and the Sinsina substation. It covers the Koulikoro region—the circles of Kangaba and Kati—within which the route impacts 31 locations.

Mali			
Region	**Circles**	**Communes**	**Villages**
Koulikoro	Kangaba	Nouga	Danga
			Diawarabougou
			Tombola
			Banancoro
			Dioula Fondou
		Kaniogo	Sombo
			Keniegoue
			Salamalé
			Téguékoro
			Makononi
		Minindian	Wolina
			Farabalen
			Golombi
		Bancoumana	Madina

Mali			
Region	**Circles**	**Communes**	**Villages**
	Kati		Sambada
			Niaganabougou
			Nankilabougou
			Kinieroba
			Bally
			Kolle
		Sanankoroba	Poste_Sinsina/Tamala
			Kabe
			Tamala
			Tourela
			Sinsina
			Siene
		Manden	Koursalen
			Koursalen Koro
			Djoliba
			Kirina

Project Activity:

The project will be divided into three phases and will comprise the following actions:

1. Pre-construction:
   - Acquisition of substation and corridor sites where the line runs

2. Construction:
   - Clearing of the trench
   - Construction of access roads and the high-tension wire
   - Pylon mapping
   - Opening of the traverse
   - Transport and handling of machinery and equipment
   - Setup of worksite offices
   - Installation of pylons and winches for energy transport cables

3. Operation:
   - Commissioning
   - Management of the utility corridor and access road maintenance
   - Maintenance of operations on the lines
   - Public safety

Project Rationale:

Objective:

Like several countries in the sub-region, Mali does not have t the power generation infrastructure necessary to meet national demand and often experiences supply difficulties. The power demand on the interconnected network has a 10% annual growth rate. Of this growth, 2% represents household energy consumption. Demand estimates for rural zones are not provided in the national statistics but they are considered to be far more important because of limited access of rural households to electricity - 14.89%

- while the urban access rate is 55.27%. Meeting this growing demand represents a major challenge for the sector.

Needs Met by the project:

The objective of the energy sector development policy adopted by ECOWAS countries is to alleviate this situation through interconnecting the different enclaved regions to the networks of power producing countries such as Côte d'Ivoire, Nigeria, and Ghana. The project complements several WAPP[1] projects. In particular, it should complete the existing interconnection with Mauritania and Senegal and the future interconnection with Burkina Faso.

Institutional, Legal, and Administrative Framework:

Environmental affairs fall under the responsibility of the **Ministry of the Environment.**

The adoption of the environmental impact assessment is a relatively recent practice in Mali. In fact, the environmental impact assessment only became subject to legal provisions under law n°01-020 of May 30, 2001 pertaining to pollution and harmful substances. Prior to this, the environmental impact assessment (EIA) was instituted by decree n° 99- 189/P-RM of July 5, 1999. Abrogated and replaced by decree n° 03-594 of December 31, 2003 establishing EIA rules and procedures, it was successively amended by decree n° 08-346/P-RM of June 26, 2008 concerning social and environmental impact assessments (ESIA) and decree n° 09-318/P-RM of June 26, 2009 regarding the same subject.

Laws:

At the national level, the project will have to comply with:

- The Constitution
- Mali's main legislative and regulatory texts regarding:
  - Classified facilities
  - Forest, fishery, and animal resources
  - The management of waste, pollutions, harmful substances, and quality control
  - Cultural, archeological, and historical heritage
  - Local Collectivities
  - Agriculture, livestock farming
  - Water resource management
  - The electricity sector

as well as the main land laws organizing the prevailing legal framework.

At the international level, the project will have to comply with the World Bank operational policies (OP) as well as those of the African Development Bank.

Finally, in addition to its national legislation, Mali has signed a number of international conventions and regional agreements on environmental and social issues. These agreements will also have to be taken into consideration.

[1] The entirety of the interconnection network is presented on the EEEOA website: http://www.ecowapp.org/?page_id=72&lang=fr

Description of the Project Environment

Physical Setting

The topographical, geological, and pedagogical features between Monts Manding to the west and the right bank of the Niger to the east are described. The erosion of soft sandstone and lateritic crusts as well as the steep and rugged landform of Monts Manding pose serious constraints for the insertion of a power line. The vast flood zone of the Niger's main bed is also an obstacle to the proposed works.
Waterways are prone to sharp seasonal rises in water levels and therefore to the influence of erosion of banks and bed sedimentation. The installation of a traverse close to the banks is therefore out of the question. These waterways play an essential role in the national economy because almost the entire population of Mali lives close to the river and its tributaries.

Biological Setting

The study area is in the "Sudanian" semi-arid to sub-humid pluviometric zone with 550 to 1,100m of precipitation annually which constitutes a "park" savannah with a continuous herbaceous layer accompanied by trees like shea and African locust. It shelters a mosaic of treed savannah (on plateaus and rises) and crops (in the major bed of the Niger and its tributaries in particular). Some riverain relics are along the river and the small rivers Kiba, Ko Ko Lon, and Bandon Kô.
To the south of Kangaba, where pluviometry is greater than 1,000mm, vegetation consists of a wooded savannah intersected by prairies and arable fields.
Along routes N.5 and N.26 (e.g. D.15), much deforestation has taken place for coal production. Shrub and grass formations may be found on the iron crusts ("bauxitic plateaus"). Some species of trees like the shea *Vitellaria paradoxa* are protected.
Four sites of ornithological interest are identified:

- The entirety of the bed of the Niger, a true axis of movement and migration for tens of bird species;
- The major bed of the Niger between Keniéroba and Nianganabougou (heronries, shorebirds),
- The Salamalé sector to the south of Kangaba,
- The riverain of the Koba river and the Bankoumana flood plain.

A power line crossing through these ecosystems may engender avifaunal losses. The beaconing of the overhead ground wire can significantly reduce bird collisions with electrical cables.
The area of study does not have any naturally protected zones (Natural Reserve, National Park). However, it does have two reserved forests: the Monts Manding reserved forest and the Kangaba reserved forest. The route of the interconnection goes carefully around these reserved forests.

Human Context

The zone is mainly populated by the Malinké and Bambara ethnolinguistic groups, with whom other ethnolinguistic groups cohabit.
Impacted households are large in size with more than 18 individuals and almost equally distributed between less than 15 years old and more than 15 years old. A slight male majority is observed.
The main economic activities are livestock rearing (small and medium) and especially agriculture. In addition, residents carry out various activities depending on situations and seasons. We therefore note that most are active in the primary and secondary sectors and generally practice more than one activity.
The level of access to basic services remains good in terms of access to water and primary education. Nevertheless, conditions for accessing health, as well as for secondary education, are still of concern. Unfortunately, several villages are still enclaved and the south of the region does not have good telephone network coverage.

Summary of Issues, Alternatives and Options

The main environmental issues and technical criteria (proximity of the 225 kV network to the south of Bamako, power efficiency, proximity to an access route) are taken into account for the selection of the best placement of the future 225 kV substation and the spindle with the least impact for the Guinea–Mali interconnection line. From this, it emerges that the best option for the future site of the substation is a site located to the West of the borough of Sanankoroba. This option has the advantage of crossing over all the environmental constraints and responding optimally to the technical criteria for installing the substation. The extension of the existing Kodialani substation, the initially selected site, is rejected because it is located in a neighborhood that has become residential and also for security reasons (concentration of the entire 225 kV network of the capital in one place) as well as technical efficiency (difficult to fortify the site in the medium term).

With regard to the option of the spindle of the 225 kV line, an initially analyzed spindle going around the Monts Manding Reserved Forest was immediately rejected for environmental (remarkable landscapes, sites of ecological, archaeological, and tourism interest) and technical (steep landforms with sharp slopes, impossible to build an access path there in the traverse of the line) reasons. In the northern sector of the area of study, a spindle is preferred in the valley of the Niger to the west of the N.26 up to the village of Kirina. More to the north, the spindle successively traverses the N.26 and the river Niger, and then connects to the site chosen for the Sinsina substation.
In the southern part of the area of study, two options are available: passing through the valley of the Niger while approaching the historical sites around Kangaba and a corridor going around the Reserved Forest of Kangaba via the west. When the environmental issues are compared for these two options, the deviation to the west of Kangaba is the simplest option by far.

Impact Analysis Tools and Procedures

Qualitative and/or quantitative evaluation tools are used to evaluate the magnitude of the impacts. The criteria used are the intensity, extent, sensitivity of the environment, and the duration of the impact. Thanks to interviews with EDG management, the consultations and experience from similar projects, an explicit weighting of the criteria was established and used to create a balanced table by which the magnitude of the impacts could be determined. A synthesis of this table is provided here:

Affected Components		**Identifies Impacts**	**Project phase**		
		Impacts not assessed	Pre-construction	Construction	Operation
		Positive impacts			
		High importance			
		Average importance			
		Low importance			
Physical Setting	Air	Ozone released by the line			
		Risks related to sulfur hexafluoride			
		Dust-related impacts			
	Surface and groundwater	Water pollution			
		Groundwater pollution at the substations			
	Soils	Soil trampling			
		Increased erosion risk			
		Soil contamination			
Biological Setting	Flora	Impacts on flower and plant diversity			
		Fireguard against the spread of vegetation fires			
		Production of clearing debris			
	Fauna	Specific impacts on birds			
		Impacts on other animal groups			
	Ecosystem	Impacts on the ecosystem services of humid zones and alluvial valleys of Tinkisso, of the river Niger and the Milo			
		Impacts on the ecosystem services of the Sudan savannah			
		Impacts on the ecosystem services of grazing and transhumance paths			
		Impacts on the ecosystem services of humid agro-forests in Guinea Forest Region			
		Impacts on the fragmentation of environments and populations of strictly forest-dwelling ombrophilous species			
		Impacts related to construction waste			
Human Context	Development	Sustainable development			
		Contribution to Millennium Development Goals (MDG)			
	Health and safety	Impacts related to electromagnetic emissions			
		Impacts related to overhanging cables			
		Impacts related to accidents (populations and workers)			
		Impacts related to spread of HIV/AIDS			
		Impacts related to ground discharge and storms			
		Impacts related to fire risks around substations			
		Impacts on cardio-stimulators			
	Employment	Job creation			
		Impacts on subcontracting			
		Project-generated economic activities (indirect jobs)			
		Impacts related to resettlements			

Affected Components		Identifies Impacts	Project phase		
		Impacts not assessed	Pre-construction	Construction	Operation
		Positive impacts			
		High importance			
		Average importance			
		Low importance			
	Land and Infrastructure	Impacts related to expropriation			
		Impacts on goods			
		Impact on plotted land and building zones			
	Social cohesion	Impacts on the redefinition of usage rights			
		Potential sources of tension			
	Transportation and traffic	Impacts related to damage to access routes or unpaved roads			
		Impacts on right of way			
	Agriculture and Forestry	Impacts related to the destruction of crops or plantations located on the construction route			
	Livestock Farming	Disturbing of livestock farming and accident risks			
	Placer Mining	Impact on traditional placer mining			
	Cultural Heritage	Impacts on historical and cultural heritage			
	Landscape	Degradation of the landscape for the VHV line			
		Visual impacts on living conditions and the landscape around the substations			
	Living Conditions	Noise and disturbances from construction machinery			
		Noise impacts for the habitatations around substations			
		Corona-effect noise, wind power noise and noise from other nearby sources			
		Noise from wind power and other nearby sources			
		Impacts from radio disturbance			

Stakeholder consultation

The study led consultations in the 31 areas impacted and spearheaded interviews in all the traversed circles and communes.
The following objectives were achieved:

- Informed stakeholders about technical, environmental, and social aspects of the project, surveyed opinions, fears, and expectations about the project and collectively evaluated what the impacts of the project could be on the environment and the society
- Gathered recommendations.

It emerged from the reports coming out of the consultations that the main fears of communities are the loss of individual and collective lands and possessions (93.33%), the loss of means of family subsistence (30%), and the accident risks (53.33%). Not surprisingly, expectations are mainly focused on compensation for loss of land and possessions (83.3%), electrification of the village (80%), arrangements for agricultural and livestock spaces (70%), and the construction of community

infrastructures and the improvement of access to basic services (63.33%). Also highlighted were high expectations regarding youth employment. Finally, the vast majority of communities want to be involved in the projects through their local representatives and suggest that various means of communication be used.

At the circle and commune levels, fears are more varied and more focused on technical aspects. The first concern is about coordination of communication processes, and of project implementation and follow-up. They are also concerned about the methods for calculating compensation and particularly that the support of the resettlement action plan (PAR) will not meet the expectations of populations and may create serious tensions within communities. Generally speaking, the deconcentrated leaders and representatives have not had to manage such a project in the past. They are requesting that an advanced skills building process be set up.

Impact Analysis Tools and Procedures

Qualitative and/or quantitative evaluation tools are used to evaluate the magnitude of the impacts. The criteria used are the intensity, extent, sensitivity of the environment, and the duration of the impact. Thanks to interviews with EDG management, the consultations and experience from similar projects, an explicit weighting of the criteria was established and used to create a balanced table by which the magnitude of the impacts could be determined. A synthesis of this table is provided here:

Resettlement Action Plan

The Resettlement action plan specifically describes the proposed loss calculation methods and compensation strategies to be adopted and presents a calibrated implementation plan which includes a complaints and disputes management system.

The PAP (Person Affected by the Project) inventory takes into account the consultations held in the villages, prefectures and technical services, as well as land surveys carried out along the entire length of the interconnection route.

For each area administrator, an evaluation of the nature of the soils composing it was conducted and a GPS survey of the boundaries was recorded. This therefore permitted a complete plotting of all the properties impacted by the line and facilitated an evaluation of the amount of the indemnities to be paid. To date, 360 areas and 329 different area administrators spread over 565 hectares have been assessed. These areas are divided into 533 different land parcels (ocean bank, plain, hill, boval). The estimated loss amount for these lands is 300,537,851 CFAF.

All of the assets on these properties and plots were appraised to determine the owners of the crops, infrastructures, fences, trees, etc. Once the ownership was recognized by the community, a property holder form was filled out, listing all of these assets by category and type. Some 14,315 fruit trees and 7,420 other ligneous tree species were counted. Seven dwellings and eight cabins or sheds were found. Finally, six watering holes were recorded. The total loss for these assets amounts to 572,389,390 CFAF for a total of 321 owners.

The Resettlement and Compensation Action Plan is published independently from the ESIA.

The Environmental and Social Management Plan (ESMP)

The Environmental and Social Management Plan is divided into several specific programs: environmental monitoring, environmental tracking, training and capacity building, and stakeholder commitment.

This notably involves collaborating with the CPSES (Prefectoral Environmental and Social Monitoring Committee) to establish local, multi-actor committees underpinned by a calibrated communication strategy; develop an employment strategy; adopt a dispute and complaint management system; establish STD/AIDS and road safety awareness campaigns; support the local services to meet the environmental and social management program's mitigation or enhancement goals; implement a communication and development plan; propose a HSE plan and a risk management and unforeseen critical needs plan.

One of the ESMP's key measures is the reforestation program to compensate for the GGE produced by the project. This will involve reforesting 598 ha of wooded savannah. The draft budget allocated for this reforesting is 785,400,000 CFAF.
The draft budget for the implementation of PAR compensations is 2,357,140,154 CFAF.

The total budget for implementing the ESMP (including the PAR compensations and reforesting) is 4,171,750,015 CFAF.

The Environmental and Social Management Plan report is published independently from the ESIA.

GUINEA-MALI INTERCONNECTION PROJECT
LINE ROUTE STUDIES AND ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENTS

Environmental and Social Impact Assessment
Guinea Section

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1. SUMMARY

Introduction

Through the West African Power Pool, ECOWAS promotes and develops power generation and transmission infrastructures in partnership with the national systems of member states. To integrate the national power systems into a unified regional electricity market, the Guinean government received a grant from the African Development Fund (ADF) to finance the Guinea-Mali Interconnection Project line route study and the environmental and social impact assessment.

The primary objectives of the Environmental and Social Impact Assessment are to:

- **Comply with the legal obligations** of the Republic of Guinea to obtain a Certificate of Conformity (CC) from the Minister of the Environment.
- **Meet national and international standards** to implement the power infrastructure construction project.
- **Aid project planning and the implementation of these different phases** in order to minimize the environmental, social and economic impact.
- **Help optimize the power transmission component** of the Guinea-Mali Interconnection Project by reducing or eliminating the environmental and social impacts caused by the installation of the power lines and related infrastructure while maximizing the positive impacts.

Project Description and Rationale:

Study Area:

The study focuses on the 591.72 kilometers of lines to be installed from Nafadji (Malian border) to N'Zerekore (Guinea Forest Region) and the substations to be built near the towns of Siguiri, Fomi, Kankan, Kerouane, Beyla and N'Zerekore. It concerns 2 administrative regions, 7 prefectures, 21 rural communities and 4 urban communities.

In all, 148 villages were identified as being potentially impacted and were the subject of thorough social and economic surveys.

Project Activity:

The project will be divided into three phases and will comprise the following actions:

1. Pre-construction:
   - Acquisition of sites for the substations and line route
2. Construction:
   - Clearing of the trench
   - Construction of access roads and the utility corridor
   - Identification of power tower locations
   - Opening of the traverse
   - Transport and handling of machinery and equipment
   - Setting up of the worksite offices

- Installation of the power towers and stringing of the power lines

3. Operation:

- Commissioning
- Management of the utility corridor and access road maintenance
- Maintenance of operations on the lines
- Public safety

Project Rationale:

Objective:

Like many countries in the sub-region, Guinea does not have the power generation infrastructure necessary to meet national demand and often experiences supply difficulties. The sector development policy adopted by the ECOWAS member countries aims to resolve this situation by interconnecting the different isolated regions to the networks of power-generating countries such as Côte d'Ivoire, Nigeria and Ghana.

Needs Met by the Project:

This project complements several WAPP projects,[1] notably by completing the Côte d'Ivoire, Liberia, Sierra Leone, and Guinea (N'Zerekore) interconnection, and the Ghana, Burkina, and Mali interconnection. Thanks to this interconnection, the major cities of Upper Guinea and the Guinea Forest Region will be able to import electricity from energy-producing countries. This project also falls within the lines of the OMVG/OMVS Energy Network (Gambia, Guinea, Guinea-Bissau, Mali, Mauritania, Senegal) development sub-program.

The Institutional, Legal and Administrative Framework:

Environmental affairs fall under the responsibility of the Ministry of the Environment, Water and Forests (created on January 4, 2011 by decree D/2011/002/0RG/SGG). Other ministries are involved in approving the ESIA, ESMP and RCAP reports.

In this context and pursuant to decree D/2011/047/PRG/SGG of February 25, 2011, on the functions and attributions of the Ministry of the Environment, Water and Forests, an administrative agency called the Guinean Bureau for Environmental Studies and Assessments (BGEEE) was created. It is notably responsible for ensuring compliance with ESIA drafting and implementation procedures.

Laws:

At the national level, the project will have to comply with the:

- Environment Protection and Enhancement Code;
- Estate and Land Code;
- Forest Code;
- Wildlife Protection Code and Hunting Regulations;

[1] The entire interconnection network is presented on the WAPP website: http://www.ecowapp.org/?page_id=72&lang=fr

- Water Code;
- Labor Code; and the
- Local Government Code.

At the international level, the project will have to comply with the operational policies (OP) of the World Bank and the African Development Bank.

Finally, in addition to its national legislation, Guinea has signed a number of international conventions and regional agreements pertaining to environmental and social issues. These agreements must also be taken into consideration.

Description of the Project Environment

Physical Environment

Upper Guinea covers a surface area of 103,235 km2. Its topography is made up of several plateaus and mountain ranges. Its Sudan-Guinean climate is characterized by a very long dry season (six to seven months) and extreme temperatures that vary from 30 to 40°C. It also suffers from the compounding effects of brush fires and the overuse of the ground cover by the population and cattle herds. Its ground soil is generally complex, as it alternates between *lithosols, luvisols, nitosols and acrisols* (Baldé et al., 1993) and presents localized shallow lateritic soils. The entire zone suffers from accelerated soil degradation. Upper Guinea lies in the upper Niger River basin. This major West African river originates in this region, near Faranah (800 m above sea level), on the border between Guinea and Sierra Leone.

The Guinea Forest Region is a mountainous region of average elevation comprising some high summits (Mount Nimba, 1752 m). The region is characterized by a subequatorial climate with temperatures ranging from 16 to 33°C and annual precipitations ranging from 1,700 mm in the north to 2,500 mm in the south. The annual rainfall varies from 1,600 mm in the south to 1,200 mm in the north. According to research and maps drafted by the National Soil Service (SENASOLS) in collaboration with the Environmental Study and Research Center (CERE), the Guinea Forest Region's ground soil can be classified into eight ferralitic soil sub-classes or ferralitic soil combinations. In the plateau zones (N'Zerekore, Yomou and Lola), the chemical fertility of the deep ferralitic soils is relatively good under the forest cover. However, when clearings spread, the mineral element cycle is disturbed. Soil acidity increases, mineral fertility decreases, and organic matter becomes more mineralized. The main rivers are the Diani, Makona, Bafing, Lofa, Niandan, Cavally, Beya and Oulé Rivers. All of these rivers have a steadier regime than those of other regions.

Biological Environment

In Upper Guinea, the line route will cross through 6 agro-ecological zones defined by the Agricultural Research Institute of Guinea (IRAG): the lower basin, the upper basin, the central plateau, the *Dion Niandan* inter-river zone, the Bassando zone, and the pre-forest zone. The ecosystems in these zones are those of the Sudan-Guinean savannas: Sudan savanna in the far north; humid savanna between Kouroussa and Kerouane; and a mosaic of forest savannas south of Kerouane.

In the Guinea Forest Region, the project will cross through 3 agro-ecological zones: the Pic de Fon east piedmont zone, the Niékoré-Guizima lowlands zone, and the Béro-Nimba dense relic forest zone. These are Liberian-Guinean ecosystems characterized by the presence of four large vegetation groups: dense primary forests, secondary forests, mesophilic forests, and thickets and fallow lands.

All of the sampled habitats in the different sections of the study zone comprised 438 bird species representing 68 families and 19 mammal species. Furthermore, it should be noted that the Mont Béro classified forest, Pic de Fon classified forest, Pic de Tibe classified forest, "Niger Niandan Milo" RAMSAR site, and "Niger-Tinkisso" RAMSAR site study identified the presence of several specific animal and plant species.

Human Environment

Three large study zones were selected for the human environment study.

- Zone 1 N'Zerekore-Lola

This is the forested zone in Southern Guinea. It is primarily inhabited by the Guerzé ethnolinguistic group, in cohabitation with other ethnolinguistic groups, including the Malinké and Konianké. The main economic activities are livestock farming (small and medium-sized breeds) and especially agriculture. There are many plantations: oil palms, kola trees, coffee trees, cocoa trees and banana trees. Subsistence crop farming is carried out using slash-and-burn practices and primarily comprises rainfed and irrigated rice, corn and tubers (yams, taro, cassava and sweet potatoes). Although Islam and Catholicism are largely represented, there is a strong syncretism with ancient beliefs.

- Zone 2- Beyla- Kérouané

Zone 2 straddles the Guinea Forest Region and Upper Guinea. It is home to "forest" ethnolinguistic groups (mainly the Guerzé) and those originating from the Mandé, primarily the Konianké and Malinké. The main language of communication is Malinké (in urban and rural areas). For all ethnic groups, the main activities are livestock farming (cattle farming prevails) and agriculture (which is semi-mechanized). The agricultural production essentially comprises rainfed rice, tubers and beans. The primary religion is Islam, which is mingled with animism. This zone is the site of important industrial mining projects.

- Zone 3- Kankan- Kouroussa- Siguiri

This zone lies at the heart of Upper Guinea and is primarily peopled by the Malinké. Placer mining is the dominant economic activity in the gold-bearing zones. Household economic strategies are also centered around livestock farming, agriculture and trade. The primary agricultural crops are rainfed rice and tubers. Citrus, mango, cashew and shea tree plantations can be found throughout the zone. Islam is the predominant religion, but a few sacred sites are still active.

Synthesis of the Issues, Alternatives and Choices

A number of technical criteria were taken into account to define the line route with the least impact. Notably, the location of the electric substations had be determined in relation to the connecting lines that will be built between the new substations and the consumption centers (Siguiri, Kouroussa, Kankan, Kérouane, Beyla, N'Zerekore and Lola) and the presence of a single access road between the cities that are to be interconnected.
From an environmental viewpoint, the line route avoids residential areas, including towns and villages, as much as possible. Thus, the substations will be located outside the cities and the line route will avoid stringing cables over any residential areas. Moreover, the line route circumvents all classified forests, national parks, nature reserves and sacred forests.

Alternate routes were studied, notably for the east/west Simandou passage and the east/west Mont Béro passage. In light of the ecological arguments, the west alternatives were selected when determining the line route with the least impact.

Consultation of the Stakeholders

The study focused on the main stakeholders and held consultations in the 148 communities and 7 prefectures through which the line route passes. The following objectives were met:

- Inform the stakeholders of the project's technical, environmental and social aspects; gather feedback, concerns and expectations regarding the project and collectively evaluate the impact the project could have on the environment and society;
- collect recommendations.

The minutes from these consultations revealed that the communities' main fears are the loss of land and personal and collective property (93.92%), the loss of family livelihood (65.54%), and the risk of accidents (61.49%). Unsurprisingly, their expectations focused primarily on compensation for the loss of land and property (93.24%), the construction of community infrastructures, and improving access to basic services (89.86%). They also showed strong expectations in regards to youth employment. Finally, a large majority of the communities expressed the desire to participate in the projects through their local representatives and suggested using various means of communication.

The concerns expressed by the prefectures are more varied and focus more on the technical aspects. The primary concern regards the coordination of the communication processes, as well as the project implementation and monitoring. The prefectoral authorities are afraid of being excluded from the project even though activities falling within their field of expertise should be carried out under their supervision. They are also afraid that the compensation calculation methods, and especially the support provided through the Resettlement and Compensation Action Plan (RCAP), will not live up to the population's expectations and thus create serious tensions within the communities. In the opinion of all the prefectures, the delineation of the means of subsistence that may be lost must be broad, which means that pasturelands and native species must be taken into account.

Impact Analysis Tools and Procedures

Qualitative and/or quantitative evaluation tools are used to evaluate the magnitude of the impacts. The criteria used are the intensity, extent, sensitivity of the environment, and the duration of the impact. Thanks to interviews with EDG management, the consultations and experience from similar projects, an explicit weighting of the criteria was established and used to create a balanced table by which the magnitude of the impacts could be determined. A synthesis of this table is provided here:

Affected Components		Identified Potential Impacts	Project Phase		
			Pre-construction	Construction	Operation
		Impacts not assessed			
		Positive Impacts			
		High Importance			
		Average Importance			
		Low Importance			
Physical Environment	Air	Ozone released by the line			
		Risk related to sulfur hexafluoride			
		Dust-related impacts			
	Surface and groundwater	Water pollution			
		Groundwater pollution at the substations			
	Ground	Trampling of the soil			
		Increase of the risk of erosion			
		Soil contamination			
Biological Environment	Flora	Impacts on flower and plant diversity			
		Impacts on forest resources			
		Natural barrier against the propagation of brush fires			
		Production of clearing debris			
	Fauna	Specific impacts on birds			
		Specific impacts on primate populations			
		Impacts on other animal groups			
	Ecosystem	Impacts on the ecosystem services of the humid zones and Tinkisso, Niger, and Milo River alluvial valleys			
		Impacts on the ecosystem services of the Sudan savanna			
		Impacts on the ecosystem services of grazing land and transhumance routes			
		Impacts on the ecosystem services of the humid agro-forests in the Guinea Forest Region			
		Impacts related to construction waste			
		Impacts on environmental fragmentation			
		Impacts on crossing RAMSAR sites			
Human Environment	Development	Sustainable development at the national level			
		Sustainable development at the regional and prefectoral level			
		Sustainable development at the local level			
		Contribution to Millennium Development Goals (MDG)			
	Health and Safety	Impacts related to electromagnetic emissions			
		Impacts related to overhanging cables			
		Impacts related to accidents (population and workers)			
		Impacts related to the spread of HIV/AIDS			
		Impacts related to lightning and storms			
		Impacts related to fire hazards around the substations			
		Impacts on pacemakers			

Affected Components	Identified Potential Impacts	Project Phase		
Employment	Job creation			
	Impacts on subcontracting			
	Economic activities created by the project (indirect jobs)			
Land and Infrastructure	Impacts related to resettlements			
	Impacts related to expropriation			
	Impacts on property			
	Impact on plotted land and constructible zones			
Social Cohesion	Impacts on the redefining of usage rights			
	Potential sources of tension			
Transportation and Traffic	Impacts related to damage to access roads or unpaved paths			
	Impacts on servitudes			
Agriculture and Forestry	Impacts related to the destruction of crops or plantations on the construction route			
Livestock Farming	Disturbance of livestock farming and risk of accidents			
Placer Mining	Impact on traditional placer mining			
Cultural Heritage	Impacts on historic and cultural heritage sites			
Landscape	Degradation of the landscape by the HVT line			
	Visual impacts on living conditions and the landscape around the substations			
Living Conditions	Noise and disturbances from construction machinery			
	Noise impacts for habitations near the substation			
	Corona-effect noise, wind power noise and noise from other nearby sources			
	Noise from wind power and other nearby sources			
	Impacts from radio disturbance			

The Resettlement and Compensation Action Plan

The Resettlement and Compensation Action Plan describes the methods used to calculate losses and the compensation strategies to adopt. It also presents a calibrated implementation plan that includes a complaint and dispute management system.

The PAP (Person Affected by the Project) inventory takes into account the consultations held in the villages, prefectures and technical services, as well as land surveys carried out along the entire length of the interconnection route.

For each property, an evaluation was carried out to determine the soil composition, and the GPS coordinates of the property boundaries were recorded. Hence, a complete landscape plan of all the properties impacted by the line was established and the amount of compensations to be paid was evaluated. To date, 1,704 properties and 1,645 different property managers covering 2,360 hectares have been recorded. These properties comprise 2,986 plots of land of varying types (lowlands, plains,

hillsides, *bowals*). The estimated compensation for the loss of these properties is GNF 15,847,973,130.

As concerns plotted lands, the boundaries of the land plots and parcels could be determined based on available cadastral maps and an owner identification process was initiated with the prefectoral and community Habitat and Urbanism services. In all, 567 plots were identified. Based on the 2013 average transaction prices, the estimated losses amount to GNF 6,002,043,100.

All of the assets on these properties and plots were appraised to determine the owners of the crops, infrastructures, fences, trees, etc. Once the ownership was recognized by the community, a property holder form was filled out, listing all of these assets by category and type. Thus, 257 hectares of crops on 735 plots were recorded by GPS. In all, 139,128 fruit trees and 95,343 other tree species were counted. Fifteen residences and 139 sanitary facilities (latrines, showers and septic tanks) were recorded in the line route. Finally, ten watering spots were recorded. The total loss for these assets amounts to GNF 71,182,562,460 for a total of 1,630 owners.

The Resettlement and Compensation Action Plan is published independently from the ESIA.

The Environmental and Social Management Plan

The Environmental and Social Management Plan is divided into several specific programs: environmental monitoring, environmental tracking, training and capacity building, and stakeholder commitment.

This notably involves collaborating with the CPSES (Prefectoral Environmental and Social Monitoring Committee) to establish local, multi-actor committees underpinned by a calibrated communication strategy; develop an employment strategy; adopt a dispute and complaint management system; establish STD/AIDS and road safety awareness campaigns; support the local services to meet the environmental and social management program's mitigation or enhancement goals; implement a communication and development plan; propose a HSE plan and a risk management and unforeseen critical needs plan.

One of the ESMP's key measures is the reforestation program to compensate for the GGE produced by the project. This will involve reforesting:
1,119 ha of wooded savanna,
916 ha of light forest,
And 209 ha of dense forest.

A provisional budget of GNF 43,849,227,000 has been allocated for this reforestation. The overall budget for the implementation of the ESMP (including RAP compensations and reforestations) amounts to GNF 225,834,410,637.

The Environmental and Social Management Plan report is published independently from the ESIA.