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AFRICAN DEVELOPMENT BANK GROUP

RURAL ELECTRIFICATION PROJECT

SUMMARY

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

REPUBLIC OF GUINEA

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SUMMARY OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

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THE PROJECT

OBJECTIVE: The project seeks to contribute to broadening the population's access to electricity. The specific objective of the project is to improve the quality of supply and access to electricity in 31 localities. This objective will be achieved through:

- reduction of technical losses and improvement of power quality by reinforcing the MV/LV networks;
- power supply to new localities by constructing stations and expanding networks.

FINANCING: The total project cost is estimated at UA 15.093 million financed by an ADF grant (99.4%) and the Government of Guinea (0.6%).

BENEFICIARIES: The project will be implemented in 31 localities in Lower and Middle Guinea. The main localities selected - Dalaba, Mamou, Pita, Bourowal Tapé, Dittin, Mitty, Lisan Souguéta, Kolenté and Kindia – have more than 250,000 inhabitants. With other localities on the roads of these localities that will also be connected - Bouliwel, Wouggorde, Sébhoré, Djangolo, Fonfoya, Bomboli, Kokoulo, Sintaly, and Hafia – the population of the project area is estimated at 1 million inhabitants.

COMPONENTS AND TECHNICAL DESCRIPTION: The project components are as follows:

- Construction of a 110/30 kV sub-station in Linsan
- Construction of 125 km 30 kV lines
- Construction of 113 km of 30/0.4 kV mixed voltage lines
- Construction of 178 km of low voltage (0.4 kV) lines
- Installation of 169 50, 100, 160 kVA overhead sub-stations and construction of 4 250 kVA masoned sub-stations
- Procurement of 25 000 electro-mechanical meters

Summary technical description of the works components

- Structural elements of medium and low voltage power transmission are as follows:
 - Pylons and respective signs;
 - Conductor and lightning protection cables, respective accessories and devices to absorb vibrations;
 - Insulating chains and accessories ;
 - Earthed circuit.
- The structural elements of source sub-stations are as follows:
 - Transformers: structure to which electric links are connected; it is the platform through which the electric power received transits (110 and 30 kV depending the sub-stations studied) and which is subsequently distributed after transformation into a lower voltage;
 - Reactance connected to the transformer to absorb the reactive power produced by the power networks;
 - The control equipment help to operate and protect the sub-station from a distance;

- Sulphur hexafluoride (SF6) circuit breakers to protect circuits and installations against any overload due to a fault current (storm, short circuit), and facilitate operation of the network by connecting or disconnecting it;
- Section switches which visibly open a circuit, vital for security. By disconnecting or connecting some circuits of the sub-station, it also distributes power transits, as well as maintenance or repair of equipment;
- Premises of Batteries de Condensers to produce reactive power and improve the power factor.

STATE OF THE ENVIRONMENT

NATURAL ENVIRONMENT

The natural environment comprises tree and bush savannah, forest massifs, forests (pines, teaks), orchards and arable land including market garden areas, and rice fields; however, most of the sectors through which the lines pass are along national roads. The natural environment has been heavily modified by human activities and proximity of the localities; under these conditions, there is only limited interest in conserving the fauna and flora. Some areas of special heritage interest are geographically localized and will not be affected by works to install the new 30 KV lines. The important natural environment areas range from the forest sectors to pre-forest or savanna areas, with a widely variable state of conservation. They have been identified and listed throughout the country in a survey by the Ministry of the Environment. The flora would not have any special features in the project areas and is quite degraded (production of charcoal, cutting of firewood). On the whole, most of the sectors do not have a lot of fauna because of their proximity to roads and localities, formerly occupied by human beings, significant level of degradation of the environment and sustained hunting and poaching.

HUMAN ENVIRONMENT

Most of the project areas are engaged in farming (market gardening, rice farms, maize, cassava, rubber, orchards, etc.). This sector of activity generates the highest number of jobs in the areas under study and provides jobs for nearly 70% of the working population. An analysis of the situation shows that the project beneficiaries belong to the following categories of electricity consumers: households, businesses subject to professional tax, SMEs and large enterprises, the Administration (public services, religious institutions, etc.) and the electricity corporation (EDG).

The sectors on which the project will focus are the residential sector, handicraft, agriculture and livestock as well as activities relating to the processing of their products, trade, public services, infrastructures, major consumers in the localities, etc.

MAJOR ENVIRONMENTAL AND SOCIAL IMPACTS

POSITIVE IMPACTS

In addition to the allowances that will be paid to the riparian population, the benefits of the high voltage lines and construction of sub-stations will mainly be:

1. Job creation during the lines and sub-station construction works, as well as creation of access roads and additional income will be a significant source of financial resources for low-income households;
2. Development of economic activities: increase, processing and sale of agro-pastoral and handicraft products as a result of the roads to be constructed;
3. Improvement of the living conditions of the targeted populations, particularly women (processing of market gardening and arboriculture products and sale of agricultural and livestock products).

TEMPORARY NEGATIVE IMPACTS

PHYSICAL ENVIRONMENT

During the construction works, there could be hydrocarbon leaks from machines on the worksite which could pollute the soil to a limited extent. The compacting of earth fills can reduce soil permeability and thereby channel runoff water. On the other hand, loose earth used to backfill pylon piles can increase the vertical permeability of the soil and bring polluted surface water (through intensive farming or effluents from living bases, for example) into the water table. The air could be slightly polluted by gas emissions from worksite machines and by noise. These temporary impacts from the construction sites are quite limited in space and time. As regards the hydrography of the environment, there will be no disruption as a result of the works on the lines.

NATURAL ENVIRONMENT

The local fauna and flora may be disrupted by the activities of the worksites and noise caused by the ML line construction works that will be close the existing 110 KV HV line. However, after the works, the fauna and original vegetation will be restored around the project structures. There will also be risks of poaching by the site workers.

AGRICULTURAL ACTIVITIES

Officers of the EDG or companies working for it will have to go into the properties at different times: creation of access roads to the power line route which will be subsequently abandoned. These various operations may cause damage of crops and the soil. It may also happen that drainage or irrigations systems, fences, hedges or paths are damaged.

PERMANENT NEGATIVE IMPACTS: LINE CONSTRUCTION

PHYSICAL ENVIRONMENT

A medium-voltage aerial line might be affected by any shifting of soil in geologically unstable areas. Some steep hill slopes could be prone to problems arising from erosion (rockfall or landslides). By erecting pylons away from these unstable areas, the project will be able to avoid the risks of rockfall.

BIODIVERSITY AND ECOSYSTEMS

The savannah slashing and tree cutting in the corridors created in forest massifs, which are required in order to erect pylons and provide access tracks, could destroy a particular type of endemic (medicinal) flora or valuable tree species; however, the solution is to lay the lines well above the vegetation and trees (citrus orchards, etc.) using raised pylons, and thus avoid destroying the vegetation beneath them, unless it is herbage. The site access works, fixtures and installations (pylon platforms and cables) will produce the same impacts: loss of vegetation. Generally, the vegetation is rapidly restored to its original state through spontaneous regeneration.

Regarding the birdlife, while the risk of accidental collision into conductors is probable, that of MV electrocution is practically inexistent, as the conductors are so far apart; the number of bird deaths by such accidental midflight collision is insignificant, compared to those from predator attacks (birds of prey, snakes, carnivorous animals, etc.) in the area. This mortality has no effect on the population of any species, given their high reproductivity.

AGROECONOMIC ACTIVITIES

There are three categories of losses concerning farm land:

Temporary loss of land usage during track construction and site installation,

Loss of usage of land on which pylons are erected,

Losses relating to parcel development, in cases where pylons are erected on irrigated land.

Land use for installation of lines poses no constraints on agricultural activity, unless the activities themselves are detrimental to the security of the line. It will only entail construction of the required tracks on the land areas concerned, without dispossessing the owners.

The height of electricity line conductors can be adapted to the type of farming activities normally conducted in the area (orchards and irrigation). The main constraint is due to the pylons, which are generally placed at 400-meter intervals. The positioning of the pylons somewhat limits the arable areas and may hinder development of irrigated or irrigable land.

The estimated overall land constraints represent 714 ha for the 30 KV (125 km) and 30/0.4 KV (113 km) lines, approximately 3 ha for erection of pylons (roughly 600), and approximately 52 ha for the construction of tracks and site installation (temporary use).

HABITAT:

The major negative impacts of the project will be:

- Purchase of land situated within the project right-of-way (for pylons, sub-station sites, and very rare cases of lines over housing areas);
- Reduction of value of land located in the immediate vicinity of the sub-stations or lines, especially where there are houses;
- Limited agricultural activity below VHV lines, and especially restrictions on certain forms of irrigation;

- Temporary reduction of density of argania trees and other forest species;
- Visual impact of this line, which runs through or over inhabited areas.

EDG avoids expropriation. The aerial MV lines can be seen from afar and will have more or less significant visual impacts, whether they are near inhabited areas or are installed away from them. The electromagnetic fields (EMF) created by the lines near the inhabited areas could distort the images on television or computer screens - even though standardized equipment is now adapted to function within magnetic fields. Similarly, the functioning of certain appliances could be disrupted by a passing incident on a line (lightning, circuit breakers flipping or tripped, etc.). Such incidents are generally limited to just a few cases per year.

HEALTH

Health may be affected somewhat by the electromagnetic field (EMF), noise pollution and ozone produced by the MV lines. The EMF effect on health is a subject of controversy. Experimental as well as epidemiological studies have yielded unclear and contradictory results, raising problems with regard to replication. There could be some risk of leukemia for children living in the immediate vicinity of the lines.

LAND USE PLANNING

It is recommended that the MV lines should not be installed in residential areas, urban suburbs or constructible areas, since these must be protected so as to guarantee future quality living conditions. The MV line route does not threaten the agricultural activities of rural areas, and it is compatible with land usage in farming areas. Reservations are expected concerning protected natural areas, given the risk of degradation of the natural sites and landscape, which are of ecological or esthetic importance. The ecological, agricultural and landscape constraints must be assessed through detailed examination of the real impact of the works on the protected areas.

EASEMENTS AND CULTURAL SITES/LANDSCAPE

There are no historical or cultural sites in the study area, since the corridor circumvents such emblematic sites. Regarding yet unknown archeological sites, there is an extremely low risk of damage during the digging for the pylon foundations and construction of access tracks.

PERMANENT NEGATIVE IMPACTS OF SUB-STATIONS

PHYSICAL ENVIRONMENT

During construction of the HVMV/LV sub-stations, the soil and run-off water could be contaminated by machine oil leaks and effluent from the sites. Wind-blown dust could pollute the air. Noise made by the machinery could also be a source of disturbance at the sites. In the operation phase, the transformer station could pose risks of contamination of the water table by the insulating oil from the transformers. It should be noted that the transformers are compliant with the regulations relating to liquid dioxin compounds. The oils containing PCB have all been eliminated. Weeding around the station is carried out manually, thus avoiding the use of herbicides that pollute the environment.

There is always the risk of explosion of transformers, causing fire outbreak and spillage of the dielectric oils they contain.

NATURAL ENVIRONMENT

The direct impact on the natural environment concerned is considered negligible, since none of the sub-station sites or areas that the 110 KV (HV) line sections and deviations cross are of particular interest in terms of flora and fauna. The sub-stations will generally be constructed on small plots (less than 5 ha) of government or communal land that has been significantly modified by human activity, and will not entail any particular impact on the inexistent natural resources. There are no natural sites on these itineraries, since they have been carefully avoided, in accordance with the EDG policy and recommendations of the Ministry of the Environment.

HUMAN ENVIRONMENT

The socio-economic impacts of a sub-station in the urban environment will be determined by the visual impact of the equipment and structures (gantry cranes, transformers, fences, etc.), which has been scaled down significantly. Noise pollution will be from the transformer windings or fans installed in the air-oil coolers. As many of the sub-stations are near roadways, the noise will be partly drowned out by that of traffic, except at night.

Impacts relating to sulfur hexafluoride (SF₆)

Compressed SF₆ gas will be used in certain airtight compartments of electrical equipment in the transformer stations. The use of SF₆ (a heavy gas) in a confined area presents the risk of asphyxia, since it reduces oxygen content. Ventilation of the areas concerned, in addition to permanent surveillance of the gas volumes, will help to eliminate the risk of SF₆ accumulation outside the compartments. SF₆ is a stable gas, heavier than air, not harmful to humans, non-toxic and non-corrosive. It is also non-explosable and non-inflammable. It is a greenhouse gas that contributes very little to greenhouse gas emission, being found in very weak concentrations. For example, its contribution is 0.01% compared to that of CO₂, which is 60%. SF₆ does not contribute to the impoverishment of the ozone layer.

ENHANCEMENT AND MITIGATION PROGRAMME

MEASURES TO ENHANCE THE POSITIVE IMPACTS

The positive impacts of the project will essentially be indirect, and will be evident only in the operating phase of the new networks. Their enhancement will depend directly on the quality of maintenance of the equipment under the responsibility of EDG, which will guarantee the connected population regular and reliable power supply and user security. The positive outcomes will be socio-economic: development of small-scale activity in all sectors (agriculture and stockbreeding and value-adding processing of their products by cold chains; sawmills, carpentry workshops, boiler shops, tailoring and embroidery enterprises, hairdressing, soap-making, oil

mills, etc. Easier access to agricultural inputs, bank credit and microcredit in the areas benefitting directly from the project will enable the population to invest in different trade and artisanal sectors, thereby improving the populations' living conditions. The main livelihood in the 2 areas of the project is agriculture.

Considering the dynamism of women in both areas, they are bound to be the main beneficiaries of the project, though it has not been designed to cover the gender angle.

During the works implementation, an effort will be made to create the maximum number of jobs for the workers in the areas concerned. The contractors will endeavour to favour artisans and traders of the region for delivery of the required services.

MAIN MITIGATION AND COMPENSATION MEASURES

The impact mitigation measures are part of the recommendations in the ESMP, as well as the special environmental specifications contained in the bidding documents.

MEASURES TO REDUCE TEMPORARY IMPACTS

The local population will be notified, prior to the start of works, of provisional limited access to certain areas for security reasons. The sites will remain well marked out (signboards, indicators, blinking lights, etc.) and protected by security barriers, set up in conjunction with the highway services of the prefectures, sub-prefectures, CRDs, etc. Road deviations will be organized as necessary. The machinery used will have soundproofing devices to limit sound nuisance to the extent possible. The vehicle exhaust levels will be according to constructors' standards. Soil compacted during the works will be ploughed to restore its natural aeration and pedologic properties; the herbaceous, shrub or tree vegetation destroyed will be restored.

PERMANENT MEASURES TO REDUCE IMPACTS

PHYSICAL ENVIRONMENT OF SUB-STATIONS AND LINES

During the construction phase

The worksites will be located away from sensitive areas. They will be marked and access thereto prohibited; site accommodations will have adequate and required sanitation facilities; waste and various solid wastes from site accommodations will be collected for disposal. The materials extraction sites will be rehabilitated at the end of the works.

The surfaces of sub-stations will be procured by the EDG; they will be drained and covered with gravel or pebbles to avoid modifying the ground and surface water regimes on lands within their areas of activity. The risks of groundwater waste and polluting oil contamination will be taken into account

All land necessary for the lines will be occupied on a temporary basis (40 years) in accordance with the law. The works will be carried out in dry weather; access tracks will be reduced to a minimum to ensure maximum preservation of the soil structure and to avoid deterioration of the sites. Equipment will be consistent with international standards and specifications relating to the

emission of exhaust fumes and noises, accidental leaks or spills. Steps will be taken to avoid erosion risk on slopes by building dikes as is the case with terrace cultivation.

In the operational phase

Periodical maintenance will be carried out so as to minimize soil disruption. There will be no direct measures to reduce noise from transformers and lines, except placing them far away from residential areas and building suitable fences.

NATURAL ENVIRONMENT

Compensatory forestation will be carried out each time trees are felled, and the choice of species to be planted will be done taking into consideration native species adapted to the climate. Workers will be sensitized on fauna and flora protection measures to ward off poaching. Sites will be rehabilitated with due consideration given to the rapid resumption of faunal activity.

FARMING

The works will be organized preferably after harvests, and damage to crops will be compensated; packed terrain (carting on access roads) will be ploughed after the works up to 50 cm. Pylons will be positioned at locations in such manner as to avoid damage on farmlands along roads, highways and land boundaries. Their height will take into consideration some constraints (irrigation, orchards, etc...). Thus, the agricultural modernization potential (mechanization, consolidation, and irrigation) will be preserved in active farming areas. The contractors will also strive to: (i) preserve drainage and irrigation systems wherever possible, (ii) temporarily stop work in case of exceptionally bad weather that would likely worsen the damage, and (iii) clean up sites by removing all debris and residues.

HOUSING AND HEALTH

EDG will, as a precautionary measure, ensure that the new MV lines are not placed overhead of residential areas so as to effectively protect residents against electromagnetic fields. EDG shall compensate all owners of homes located in the danger zone. Beyond a radius of 30 m away from the conductor, electric fields lessen significantly. International EU and WHO standards regarding limits of public exposure to electromagnetic fields will be respected.

LIVING ENVIRONMENT AND LANDSCAPE QUALITY:

Visual impact can be controlled by placing the lines away from tourist sites. The surroundings of substations will be landscaped for visual impact. The visual impact of the MV line will be achieved by planning the line routes near existing 110 kV HV lines, avoiding ridgeways and using landscape features to reduce visibility.

The cost of mitigation measures is estimated at 100,000 Euros. A more precise estimate will be done, according to EDG's best practice, before the commencement of works.

MONITORING PROGRAMME AND ADDITIONAL INITIATIVES

DESIGN AND WORKS PHASE

From the outset, the project designers received advice from the "Environment" Division of the company. During the works, the contractor and representatives of the relevant Ministries and their regional offices will ensure that the laws in force are applied: protection of physical, natural and human environment. The contractors will present their own environmental management plan before work begins, to demonstrate their knowledge of environmental and social issues.

OPERATIONAL PHASE

Monitoring of noise and electromagnetic fields: These factors will be measured periodically at the sub-stations and in houses near lines and sub-stations. International standards set by WHO for public exposure limits will be met.

Follow-up of the population's grievances: As part of the population's participatory approach, a grievances register will be opened in the municipalities affected by the various project components. The population will be invited to enter their remarks in the register. EDG will respond to the claims made and take all necessary steps to address them.

PUBLIC INFORMATION AND/OR CONSULTATION PROCEDURES AND REMEDIES

The populations and Regional Authorities were consulted during the project design and ESMP execution phase. This participatory approach will continue during finalization of the line routes study to minimize damage to farms and nature value sites, and to protect housing. Damage to private property will be identified and compensated by EDG. Owners who do not approve of the terms and conditions of compensation may seek administrative or legal redress. According to the procedure put in place, the persons to be compensated will be identified by the company, in collaboration with the Project Manager and Regional Lands and Surveys Services or religious leaders.

INSTITUTIONAL ARRANGEMENTS AND CAPACITY BUILDING REQUIREMENTS

In accordance with institutional arrangements and the Environmental Code in Guinea, EDG's Environment Service is responsible for the environmental and social monitoring of projects it is implementing. The "Environment Service" is under the Department of Planning and Equipment; the "Security Service" and the "Social Service" are under the Department of Human Resources.

It is recommended, as part of organization of a service in charge of environmental matters, that an "Environment-Social Security" Department be set up to incorporate these services in 3 different divisions.

The division should be reinforced to deal specifically with environmental and social issues related to power generation, electricity transmission and distribution, transformer stations and the use of insulating oils, etc. The need for support will be addressed over two years in three major components:

- 1- Seminars and training for better understanding of the company's environmental and social promotion targets
- 2- Human and logistical reinforcement of the structure (hiring managerial staff, equipment, transportation, etc.).
- 3- Technical support - a consultant.

To ensure a consultative and quality approach, it is also recommended that a committee be set up to evaluate environmental monitoring, comprising:

- 1- The "*Environment-Social-Security*" Department of EDG
- 2- The Environmental Unit of the Energy Ministry
- 3- The Environmental Assessment Department of the Environment Ministry
- 4- Representatives of the population (NGOs, population, civil society, etc.).

The estimated cost of upgrading the Contractor's Environment-Social-Security Department is US\$ 162 000

PUBLIC CONSULTATIONS AND INFORMATION DISSEMINATION REQUIREMENTS

The project was designed based on Guinea's development guidelines drawn up in a participatory manner. The population and Regional Authorities were consulted during the project design and ESMP execution phase. Within the **participatory approach** framework, fieldwork comprising information sessions and consultations was conducted from 22/08/2010 to 27/08/2010 in 11 localities, allowing for discussions with over 100 participants representing:

- Regional authorities, Prefects and Sub-Prefects, Mayors and Deputy Mayors
- industrial and small-scale companies
- Women's, farmer, livestock and commercial associations,
- NGOs
- Civil society
- the population
- etc.

This participatory approach will continue during finalization of the line routes study to minimize damage to farms, nature value sites, and to protect houses. Damage to private property will be identified and compensated by EDG. Owners who do not approve of the terms and conditions of compensation may seek administrative or legal redress. According to the procedure put in place, the persons to be compensated will be identified by the company, in collaboration with the Project Manager and Regional Lands and Surveys Services or religious leaders.

In addition, the participatory approach was considered during:

- Socio-economic surveys conducted among the population and local authorities concerned;
- Validation seminars organized for all project stakeholders;
- Visits to rural communities during project preparation and which continued up to the project's technical evaluation phase. These visits brought to light the population's expectations and the strong political will of the Guinean authorities who view this project as a vehicle for change in the economic development framework of the affected communities.
- Development of the various project components in close collaboration with all institutions of the sector; they constitute a response to the constraints on the country's rural electrification development and service quality improvement required by the customers and Local Authorities.
- Design, by consulting with other donors involved in the electricity networks development sector in the country, to ensure collective consistency and synergy.

The rural electrification project must meet certain **information dissemination** and participatory approach requirements set out by the ADB. They can be summarized as follows:

- Provide simple and understandable information for the entire population concerned so as to elicit ownership and enable the project to achieve its objectives.
- Disseminate general information about the Government's programme relating to the rehabilitation and extension of the Project Manager's equipment and structures throughout the country;
- Provide all required information relating to project design, organization of work sites and works, clearly identifying the socio-economic benefits to the population, tourism development, health centres, handcraft, PMU and industries that may relocate; demonstrate the project's harmlessness to the natural environment and biodiversity; demonstrate the benefits to the population.
- Disseminate information about potential expropriation risks, the temporary displacement of some commercial activities (trading stalls), and damage to private property during the works, and the possible and intended Relocation Plan and compensation provided for persons that may suffer damage.

- Distribute the draft Environmental and Social Assessment and the Environmental and Social Management Plan to project-affected parties and request feedback in order to improve the document and the project content;
- Address issues concerning the location of worksites and construction sites;
- Hold discussions with target persons or groups on ambiguous or contested issues; correct or, if applicable, complete the ESMP taking into account the remarks made;
- Broadcast the final version or summary of the ESMP through the media.

COST ESTIMATES

The actions recommended in the ESMP should normally be financed as part of the cost of works or by the Project Manager's operating budget earmarked for oversight activities proposed in the ESMP or entirely as part of the project costs under the environmental and social monitoring of the works.

Cost estimates for environmental and social measures, falling within the scope of the ESMP, will be made by Contractors within the framework of ITTs related to each phase of works; the costing may also be carried out by the various administrative bodies concerned that are familiar with some of its aspects. The estimated costs of mitigating the project's negative impacts, compensation, monitoring and institution building stand as follows:

N	Items	Amount	
		Other	UA
1	Institutional arrangements and capacity building requirements	US \$162000	104100.4
2	Environmental and social impact mitigation measures	€100000	87701.60
3	ESMP control and monitoring	€25000	21925.40
4			213727.4
	Contingencies		36272.6
	E&S		
	TOTAL		250,000

IMPLEMENTATION SCHEDULE AND REPORTING

As concerns the implementation of environmental measures and activities, the project implementation team's role will be that of mitigation and improvement. The timeline for implementing these activities and reporting are the same as for the project. The ADF will also conduct a detailed review of the project during its monitoring missions. The reports provided by the project team will include physical progress of work, environmental impact assessment forms,

and audits carried out. These quarterly reports will be forwarded to the Bank. The monitoring mission will, on a quarterly basis, assess the effectiveness of the ESMP and structure in place.