

*Economic Community  
Of West African States*



*Communauté Economique  
Des Etats de l'Afrique de l'Ouest*

**WEST AFRICAN POWER POOL**  
**SYSTEME D'ECHANGES D'ENERGIE ELECTRIQUE OUEST AFRICAIN**  
*General Secretariat / Secrétariat Général*



**GHANA – BURKINA – MALI (GBM)  
INTERCONNECTION PROJECT**

**TERMS OF REFERENCE FOR  
UPDATE OF THE PRE-INVESTMENT STUDIES:  
FEASIBILITY STUDIES AND ENVIRONMENTAL AND SOCIAL  
IMPACT ASSESSMENT**

*December 2020*

## List of Abbreviations

AFLS	Automatic Frequency Load Shedding
CC	Combined Cycle
ECOWAS	Economic Community of West African States
EDM-SA	Énergie du Mali - SA
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FCR	Frequency Control Reserve
FOTS	Fibre Optical Transmission System
FSD	Forest Services Division
GRIDCo	Ghana Grid Company
MALS	Manual Activated Load Shedding
MDR	Momentary Disturbance Reserve
OPGW	Optical Ground Wire
RAP	Resettlement Action Plan
ROW	Right-Of-Way
SCADA	Supervisory Control and Data Acquisition Systems
SONABEL	Société Nationale d'Electricité du Burkina
TOR	Terms Of Reference
WAPP	West African Power Pool

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## WEST AFRICAN POWER POOL (WAPP) SECRETARIAT

### GHANA – BURKINA – MALI INTERCONNECTION PROJECT

#### TERMS OF REFERENCE FOR UPDATE OF PRE-INVESTMENT STUDIES

## **1. INTRODUCTION**

### **1.1. *Objective of WAPP***

The Objective of the WAPP is to establish a regional electricity market in West Africa through the judicious development and realization of key priority infrastructure that would permit the accessibility to economic energy resources, to all member states of the ECOWAS.

In order to further advance the implementation of the priority projects of the West African Power Pool (WAPP), the WAPP Secretariat and WAPP Members are developing the following priority interconnection projects:

- 330 kV Volta (Ghana) – Lomé ‘C’ (Togo) - Sakété (Benin) Interconnection project;
- 225 kV Guinea – Mali Interconnection Project;
- 330 kV Nigeria – Niger – Togo/Benin – Burkina Interconnection Project;
- Ghana – Burkina – Mali Interconnection Project.

In this context, the WAPP Secretariat on behalf of the Ghana Grid Company (GRIDCo) of Ghana, the Société Nationale d’Electricité du Burkina (SONABEL) of Burkina and the Énergie du Mali–SA (EDM-SA) of Mali, intends to procure the services of an International Consulting firm to undertake, the following activities among others on the Ghana – Burkina – Mali Interconnection Project (GBM):

- Update of line route study and production of maps, substations plans and line profile drawings
- Detailed Feasibility Study
- Update of Environmental and Social Impact Assessment (ESIA) of the project and preparation of updated Environmental Impact Statement, Resettlement Action Plan (RAP), and Environmental and Social Management Plan (ESMP)
- Preparation of bid documents for an EPC (Engineering, Procurement and Construction) contracts
- All Permits and Licenses required

### **1.2. *Objective of the Proposed Project***

The ECOWAS Master Plan for the Development of Regional Power Generation and Transmission Infrastructure 2019 - 2033 adopted by the ECOWAS Heads of State and Government in 2018 through Supplementary Act A/SA.4/12/18 identifies the key priority projects that need to be implemented to ensure stable integration of the national electricity networks in the ECOWAS Region and facilitate optimal power exchanges and trading among the Member States. Prominent

among the infrastructure projects is to develop the Ghana – Burkina – Mali Interconnection Project, which seeks to establish a robust transmission link from Bolgatanga in Ghana to Sikasso in Mali passing through Bobo Dioulasso in Burkina.

The electricity demand in Ouagadougou, the capital of Burkina Faso, is primarily met actually through domestic thermal and solar power generation as well as importation from Cote d'Ivoire and Ghana. In Mali, the percentage of thermal production in the generation mix is significant. The economic difficulties of operating thermal power plants, especially their high costs of production, have negatively impacted on the productivity and the competitiveness of the national economies of these countries. Furthermore, the demand is constantly growing and this necessitates additional generating capacity especially during peak periods. This situation requires that the energy supply capacities of EDM-SA and SONABEL be reinforced urgently especially through the diversification of their mode of electricity provision.

In order to increase the reliability and stability of power exchanges among the ECOWAS Member States of Ghana, Burkina, Mali and beyond, the ECOWAS Master Plan has re-affirmed as priority the implementation of an interconnection line among these countries that shall also serve to enhance the optimal performance of the power systems of the concerned national power utilities. In addition, this interconnection line shall also increase reliability of power supply to Ouagadougou given that it shall provide an alternate path for importations from Cote d'Ivoire as well as Ghana. With respect to the WAPP interconnected system and with the expected full deployment of the regional electricity market in West Africa by 2020/21, the establishment of secure and reliable transmission corridors to support market operations becomes paramount.

In addition, the region's renewed drive to significantly augment the portion of new Renewables (Solar, Wind) in the regional energy mix requires that more stable and reliable transmission infrastructure connected to hydropower assets is needed to provide the necessary balancing support. In this regard, the Ghana – Burkina – Mali Interconnection Project coupled with the 225 kV Guinea – Mali Interconnection Project currently under implementation, shall provide a key linkage between the abundant hydropower resources in Guinea and the abundant solar power resources in Mali and Burkina thereby creating opportunity for an enhanced development of these variable energy resources. This shall also provide mitigation to the intermittency challenge associated with variable renewable generation.

The WAPP Secretariat, GRIDCo, SONABEL and EDM-SA therefore intend to undertake a project that shall comprise the construction of a double circuit high voltage transmission line from Bolgatanga in Ghana to Sikasso in Mali through Bobo Dioulasso in Burkina with associated high voltage substations. This project, which would greatly facilitate the power exchanges among the countries in the West Africa sub-region, is known as the **Ghana – Burkina – Mali Interconnection Project (GBM)**. The GBM interconnection will also facilitate the synchronization and enhanced operational security of the WAPP interconnected network.

As part of social mitigation measures and to increase acceptability, the project also envisages to provide electricity to all eligible villages/towns/communities that are 5-km on each side of the line corridor.

The project, which shall be executed in Ghana, Burkina-Faso and Mali, shall indicatively result in the following among others:

- Construction of approximately 566 km of high voltage double circuit transmission line of which 149 km will be in Ghana (emanating from Bolgatanga), 362 km in Burkina (via Bobo Dioulasso) and 55 km in Mali (terminating at Sikasso);

- Extension of/or the construction of a new high voltage substation at Bolgatanga (Ghana) or environ;
- Extension of/or the construction of a new high voltage substation at Bobo Dioulasso (Burkina) or environ;
- Extension of/or the construction of a new high voltage substation at Sikasso (Mali) or environ;
- Installation of SCADA and communication as well as fibre optic systems (OPGW) and integration to the National Dispatch Center of the involved WAPP Member Utilities;
- Electrification of eligible communities/villages along the line route of the project and nearby substations;
- Installation of appropriate compensation synchronization equipment and other equipment for frequency and voltage regulation (UFR, etc) if required;
- Reinforcements of the networks of the involved WAPP Member Utilities - GRIDCo (Ghana), SONABEL (Burkina), and EDM-SA (Mali) if necessary.
- Installation of Protection and Control equipment.

The project requires an update of a Line Route and Environmental and Social Impact Assessment (ESIA) to be carried out in line with national requirements and the latest relevant Environmental Policies and Guidelines of the Funding Agencies such as the World Bank Environmental and Social Framework (ESF), as well as the World Bank Group General Environmental, Health and Safety Guidelines (EHSs) and the EHSs for Electric Power Transmission and Distribution, the African Development Bank Safeguard Policies, Agence Française de Développement, European Union Directives, the Millennium Challenge Corporation, and the KfW, as well as an update of the existing Feasibility Study to re-affirm the technical feasibility and economic viability of the project which shall be done in sufficient detail that would permit the preparation of bidding documents that shall include pre-qualification requirements. In cases of conflicts of the various requirements, the most stringent requirements shall apply. The Consultant shall work very closely with the WAPP Secretariat, GRIDCo, SONABEL and EDM-SA to assess the suitability of the existing Substations to accommodate the project, determine the optimal locations for the new substations and an optimal routing for the Transmission Line. All work related to the identification and selection of the line route and substations, to the ESIA and to the preparation of bidding documents for EPC Contracts shall be deemed to have been included in the Technical and Financial Proposals of the Consultant.

### ***1.3. Status of the Proposed Project***

A Line Route and ESIA Study, as well as a Feasibility Study were prepared by the Korea Electric Power Corporation (KEPCO) in 2009 that eventually resulted in Environmental Permits being issued in all three (3) concerned countries and financing being identified with some Funding Agencies for project implementation. Due to comments received on the Reports by the Funding Agencies interested in financing the project as well as changes in the scope of the project, notably in Ghana and Mali, additional funding had to be mobilised to conduct complementary studies. As such, Artelia was recruited in 2013 to prepare the complementary studies related to Line Route and ESIA and the final reports, though having addressed the concerns of the Funding Agencies, need to be updated due to expiration of the Environmental Permits as well as changes in the legislation related to environmental protection in some of the concerned countries and the new World Bank ESF. Similarly, EDF was recruited in 2013 to prepare the complementary study related to Feasibility. Also, the outcome of the studies, though having addressed the concerns

of the Funding Agencies, needs to be again updated due to the time that has lapsed as well as the need to re-evaluate the Line and Environmental and Social Impacts as a result of among others, changes in the legislation related to environmental protection in some of the concerned countries and voltage of the power line recommended in the ECOWAS Master Plan for the Development of Regional Power Generation and Transmission Infrastructure 2019 – 2033. It is in light of these circumstances that a Consultant is needed to update the Pre-investment Studies of the Project including the Line Route and ESIA Study and the Feasibility Study and to prepare Bidding Documents accordingly as approved packaging for Transmission lines and Substations that shall include also Pre-qualification requirements for EPC contracts.

## **2. CONTEXT OF THE STUDY**

### **2.1. Ghana Grid Company (GRIDCo)**

The Ghana Grid Company (GRIDCo) was established in accordance with the Energy Commission Act, 1997 (Act 541) and the Volta River Development (Amendment) Act, 2005 Act 692, which provides for the establishment and exclusive operation of the National Interconnected Transmission System by an independent Utility and the separation of the transmission functions of the Volta River Authority (VRA) from its other activities within the framework of the Power Sector Reforms. The company became operational on August 1, 2008 following the transfer of the core staff and power transmission assets from VRA to GRIDCo.

The main functions of GRIDCo are among others:

- undertake economic dispatch and transmission of electricity from wholesale suppliers (generating companies) to bulk customers, which include the Electricity Company of Ghana (ECG), Northern Electricity Distribution Company (NEDCo) and the Mines;
- provide fair and non-discriminatory transmission services to all power market participants;
- acquire and manage assets, facilities and systems required to transmit electrical energy
- provide metering and billing services to bulk customers.
- carry out transmission system planning and implement necessary investments to provide the capacity to reliably transmit electric energy; and manage the Wholesale Power Market.

As at December 2019, the grid of GRIDCo was characterized by 993 km of 330 kV Transmission Lines, 75km of 225 kV Transmission Lines, 5,270 km of 161 kV Transmission Lines, and 213 km of 69 kV lines. The total power transformer capacity of the entire transmission network as of december 2019 was 9,045.2 MVA.

The network of GRIDCo is integrated into the Coastal Transmission Backbone that also includes the systems of Nigeria, Benin, Togo and Côte d'Ivoire. An interconnection between Ghana and Burkina was commissioned in 2018. An interconnection from Nigeria to Cote D'Ivoire through Benin-Togo-Ghana (Median Backbone) is under development and expected to be commissioned in 2025.

### **2.2. Société Nationale d'Électricité du Burkina (SONABEL)**



The Société Nationale d'Électricité du Burkina (SONABEL), an enterprise with a capital of FCFA 46 billion completely owned by the State of Burkina through Decree N° 97-599/PRES/PM/MEM/MCIA of December 31<sup>st</sup>, 1991, has gone through several transformations since its genesis in 1954 as a private company called AOF Energy responsible for generation and distribution of electricity in Ouagadougou. SONABEL is responsible for the generation, importation, transmission and distribution of electricity in the localities within its domain. SONABEL holds a monopoly in power importation and transmission.

SONABEL imports electricity from Cote d'Ivoire, Ghana and Togo. Its national power generation park comprises mainly of thermal power plants and hydropower plants with a cumulative installed capacity of 197 MW in 2011. As at December 31<sup>st</sup>, 2011, power importation represented 48% of total generation. The hydropower generated from its own plants represented 8%.

The principal transmission lines that exist in Burkina are the 132 kV linking the hydropower facilities of Bagre and Kompienga to Ouagadougou and the 225 kV Ferkessedougou (Cote d'Ivoire) – Bobo Dioulasso (Burkina) – Ouagadougou (Burkina) transmission lines. The total length of the transmission lines is approximately 1,370 km including the 225 kV Bobo Dioulasso (Burkina) – Ouagadougou (Burkina) Transmission line completed in 2008 and of approximate length 350 km. The 225 kV Bolgatanga (Ghana) – Ouagadougou (Burkina) Interconnection Project was commissioned in 2018. An interconnection to Nigeria through Niger is under development and expected to be commissioned in 2022.

### ***2.3. Energie Du Mali – SA (EDM-SA)***

EDM-SA is an autonomous Malian Utility with a registered capital of 32 billion FCFA of which 64% is state-owned and 34% owned by the IPS-WA Group.

EDM-SA, under a concessionary agreement, manages the public electricity services within 33 localities, 12 of which are on the interconnected network, 19 on isolated centres and 2 supplied by the Ivorian network.

The utility's total installed capacity is 141 MW (Manantali excluded), of which 109 MW is on the interconnected network. This interconnected network consists of 52% thermal power and 48% hydroelectric power.

The existing transmission lines comprise of the following: 247.8 km (150/66 kV), 212 km (30 kV), 1,223 km (15 kV), and 2,894 km distribution lines of 0.4 kV.

At the end of 2005, there were 160,200 customers, 1,019 of which were on MV and the remaining on LV. About 81% of customers (i.e. 129,594) are on the interconnected network.

For the past 5 years, demand (generation + energy purchase) on the interconnected network increased from 414 GWh in 2000 to 711 GWh in 2005, i.e. an average annual growth of 11.4%. During this same period, sales on the interconnected network witnessed an average annual growth of 12.3% that is from 304 GWh in 2000 to 542 GWh in 2005.

## **3. OBJECTIVE OF THE TERMS OF REFERENCE (TOR)**

The Objective of this TOR is to engage the services of a qualified and experienced International

Consulting Firm to carry out an update of a Line Route Study, select substation sites, prepare an ESIA, a Resettlement Action Plan (RAP), conduct a Feasibility Study and finalize associated functional associated functional EPC Bidding Documents.

However, candidates are required to put in place “Chinese Wall” type conditions that will foster balanced and fully independent views between technical aspects on the one hand and environmental and social aspects on the other hand, as well as prevent any conflict of interest. These conditions shall include among others (i) full independence of the two teams (technical, and environmental & social); (ii) each team manages, prepares and validates their specific deliverables independently; and (iii) if deemed required, mobilization of neutral/balanced overall coordination, independent from the two teams. The two teams are nevertheless still required to work in close collaboration and share core data in order to ensure coherence and consistency of all deliverables.

#### **4. SCOPE OF SERVICES**

The Consultant shall undertake the Studies and provide the required services in accordance with internationally recognized practices for Consultancy Services. The Consultant shall also ensure compliance with international standards, applicable laws and regulations in the various countries (Ghana, Burkina, and Mali), International Agreements on environment ratified by the countries involved in the Project as well as Funding Agencies such as the World Bank (WB), African Development Bank (AfDB), Millennium Challenge Corporation (MCC), Agence Francaise de Developpement (AFD), KfW and European Union (EU) Guidelines. As such, it shall be assumed that the Consultant has made in-depth knowledge of these requirements prior to submitting Technical and Financial Proposals.

Should there be any conflicts between the applicable laws, regulations and directives, the more stringent guidelines of the afore-mentioned institutions shall take precedence.

The Consultant shall keep accurate and systematic records and accounts in respect of the Services in such form and detail as is customary and as shall be sufficient to establish accurately that the costs and expenditures have been duly incurred.

As part of the Scope of Services, the Consultant shall conduct a Line Route Study, ESIA, detailed network analyses (static and dynamic) and prepare Engineering Designs including drawings and line profile, preliminary cost estimates, bidding documents and implementation schedule. The Consultant shall provide the WAPP Secretariat and concerned countries with the requirements for the implementation of the project.

In undertaking the assignment, the Consultant shall review the latest WAPP Master Plan as well as the National Master Plans of the countries concerned as all past systems studies conducted for the project with the view to firming them up. The Consultant shall investigate in detail among others, on dynamic stability (N-1 criteria, load shedding, etc) , line end voltage rise, power transfer capability, and lightning and switching over-voltages with recommendations for mitigation. The Consultant shall also conduct preliminary engineering investigations that shall allow the preparation of specifications and quantities for among others, towers, foundations, insulators, conductors, in addition to all substations infrastructures and equipment and earthing arrangements suitable for inclusion in Bidding Documents.

The Scope of Services shall consist of but not limited to:

- Data Collection and Review
- Line Route Study and Substation Site Selection
- Environmental and Social Impact Assessments (ESIAs), for Ghana, Burkina Faso and Mali
- Resettlement Action Plan (RAP)(s) for Ghana, Burkina Faso and Mali
- Feasibility Study including Technical, Financial and Economic Analyses
- Risk analyses
- Training and Capacity Building Programme for the utilities, including Environmental and Social Management and Occupational Health and Safety during construction and operation
- Project Packaging and Preparation of Pre-qualification if required and Functional Bidding Documents for EPC Contracts
- Preparation of Terms of Reference of Owner's Engineer

#### **4.1. Data Collection and Review**

Following the kick off meeting, the Consultant shall immediately proceed with the data collection exercise aimed at among others, collating all the necessary information for the conduct of the Studies in full compliance with countries national regulations and Funding Agencies Guidelines. The Consultant shall gather, review and compile all relevant environmental, social, technical, economic and cost data on the Ghana, Burkina and Mali networks necessary for the conduct of the study. The Consultant shall review all existing available reports that could contribute in preparing the updated Studies. The Consultant shall review all necessary data and reports on the proposed Ghana-Burkina-Mali Interconnection Project, and any other additional information that could help in the conduct of the Studies. The Consultant shall review the national and international environmental and social and health and safety and labour policies, procedures and legislation and regulatory frameworks as they apply to the assignment. The Consultant shall take into account the requirements of the various institutions in charge of environmental and social protection in each country and also the requirements indicated in Appendix 4 and comply accordingly. Requirements of Funding Agencies shall also apply.

The data shall include but not be limited to:

- a) Existing available reports (Feasibility, Environmental and Line Route)
- b) Existing examples of applicable resettlement action plans
- c) Loads, load factors and load forecasts,
- d) Population and electricity access rates,
- e) Generation and transmission facilities in the interconnected systems,
- f) Generation and transmission system expansion plans(WAPP, Ghana, Burkina, Mali, Cote d'Ivoire, Guinea, Togo/Benin, OMVS, OMVG),
- g) Projected levels of power exchanges between the three (3#) utilities and the WAPP interconnected system,
- h) Current System Operating conditions,
- i) Single line diagrams, site plans, layout drawings, protection schemes, types of circuit breakers and their transfer ratings for the required high voltage substations in all the countries involved,

- j) Conductor sizes and tower designs for high voltage transmission lines in the electricity networks of the three (3#) countries,
- k) Countries rural electrification master plans.

In proposing designs for the transmission towers, the Consultant shall collect reports on testing of the various types of towers and conductors for the transmission lines. In order to minimize bird mortality, towers at river crossings, near wetlands and important bird areas need to be towers with a proven lower bird mortality, such as Normal Suspension Towers instead of Guyed V Suspension Towers, which have a proven higher bird mortality. At these sites also the distance between conductors need to be at least 3 meters to minimize bird electrocutions. The Consultant shall maintain contact with GRIDCo, SONABEL, EDM-SA and the WAPP Secretariat to ensure that the most recent data are collected. The Consultant in conjunction with WAPP Secretariat, GRIDCo, SONABEL, EDM-SA shall analyse the use of these towers for the construction of the Ghana – Burkina – Mali Interconnection Project, make cost-benefit analyses, and elaborate on the risks involved.

In the case where the required data is not available, the Consultant shall use his best judgement based on acceptable international practice to provide substitute data. The Consultant shall however provide a justification for the choice of data in the Data Report and consider sensitivity analysis on the key data that could impact the results..

As part of the ‘Data collection’ exercise, the Consultant shall also collect and present information relating to the prevailing Institutional and Financial state of the power sectors in each country in the Data Report. The Consultant shall furthermore catalogue any ongoing institutional reforms in the electricity subsectors of the concerned countries and take these into account in proposing an appropriate institutional framework to implement the project. All the information collected by the Consultant shall be submitted as part of the Data Collection Report.

## **4.2. Line Route Study and Substation Site Selection**

### ***4.2.1. Line Route Study***

The scope of services by the Consultant shall include, but not be limited to the following:

- Study of line route
- Detailed survey and profiling of line route
- Preparation of relevant maps and drawings

#### ***4.2.1.1. Study of Line Corridor / Preliminary Survey***

The Consultant shall review previous Line Route Study and on the basis of recent high definition satellite images (define resolution and ages) and field investigations, propose a provisional line route that takes into account any necessary changes from the previous Line Route. The outcome of this study will be submitted as a separate Report with the Data Report. During the Line Route Study review, the Consultant shall take into account, among other things, the following features within the Line Corridor (at least 1km wide):

- Minimization of the impact on the physical environment spatial-area planning, trees, protected and sacred forests, RAMSAR sites, etc. – consideration of Technical, economic, environmental, cultural and social issues
- Avoidance or minimization of impacts on human settlements and livelihoods (houses, villages, towns, settlements, public/community infrastructure, productive land)
- Promote linear infrastructures regrouping to avoid fragmentation
- Avoidance of inhabited areas but staying close enough to facilitate their electrification
- Foster proximity with roads to facilitate access for construction and operation
- Optimize the routing and the technology (underground cable, pole towers, etc) in urban area to minimize the impacts
- Avoidance of low bearing capacities areas and waterbodies: wet-lands, inundated areas, rivers and lakes
- Avoidance of take-off/approach and transition surfaces of airports and airfields as well as telecommunications towers
- Avoidance of areas with large transversal slope risk of erosion, slope instability or other geotechnically hazardous areas
- Avoidance of inaccessible zones, mountainous areas, protected areas and ecologically sensitive zones
- Minimization of the cost of construction and maintenance of the line (optimization of the length, number of deviations and accessibility of the line, etc.)
- Compliance with the local, regional and national development master plans of the built-up areas - Areas marked for future development has to be obtained from the relevant Land use and Spatial Planning Authority Office responsible for the area.
- Guidance from GRIDCo, SONABEL and EDM-SA as appropriate regarding routing and planning standards in Ghana, Burkina and Mali respectively.

Using a multiple-criteria decision analysis (MCDA) approach, the Consultant shall propose and examine alternatives for the updated Line Route and make a justified recommendation of an optimal line route that minimizes Environmental and Social Impacts, avoids or minimizes resettlement impacts, and conforms to National, International and Funding Agencies' Guidelines. The justification for the recommended line route should contain among others, an evaluation of the advantages and disadvantages of each alternative of line route examined. The proposed optimal line route must avoid all environmentally and socially sensitive areas including settlements, protected forests, national parks, wetlands, cultural and heritage sites, and RAMSAR sites. In this regard, the Consultant shall work very closely with designated experts from each national utility, as well as consult with local stakeholders such as commune councils and NGOs that represent a cross-section of the population (including women's groups, groups representing different social groups, etc). The Consultant shall also carry out public consultations in compliance with the Stakeholder Engagement Plan (SEP) determining the line route and shall ensure that these consultations are documented in signed Minutes of Meeting with verified lists of participants. These consultations shall include presentation and guidance for stakeholders on the use of an agreed grievance mechanism. These consultations should take place at various levels, national, regional, provincial, districts and communities crossed by the proposed line route.

A detailed description of the selected Line Corridor, **including photographs, satellite imagery, maps and GPS coordinates**, shall be provided by the Consultant depicting the location of all natural features such as relief features and artificial features as well as all other useful details.

The description shall be provided in GIS format as well and shall include but not be limited to the location of the various features listed below which should be featured in the drawings/maps:

- a) Man-made structures or obstacles (all types of residential and non-residential structures such as roads, streets, houses, community halls, markets, schools, dams, hospitals, offices, commercial buildings, government buildings, including information on construction materials for all these built environment elements;
- b) Infrastructure (existing power transmission and distribution lines, existing telephone lines, railroad, footpath and highway crossings, microwave towers, stream crossings etc.)
- c) Physical features (rivers, streams, mountains, valleys, swamps, farmlands, forest reserves etc.)

The description on the Line Corridor shall in particular provide an exhaustive list of all the local administration areas, provinces, districts and villages traversed by the project. For each of these, the following shall be identified with the support of GPS coordinates:

- a) Boundaries of allocated zones;
- b) Demarcation of farmlands and potentially affected properties;
- c) Hunting Reserves, protected areas, national parks and Forest Reserves
- d) Cultural, Religious and Heritage Sites including but not limited to cemeteries, sacred forests, and culturally significant natural features
- e) Markets and areas with high population densities in potentially allocated or non-allocated areas.

The description of the Line Corridor shall also include commentary on the importance of animal and plant biodiversity in the wider corridor area, type of vegetation, topography and geology (nature of soils, flooded area, etc) within each community and their land use pattern for the entire line route.

The Consultant shall note that all of the above shall be contained in the draft report on the provisional line route.

The Consultant shall evaluate “Right-of-Way” (ROW) requirements of the countries depending on the level of voltage required. It should be noted that, subject to these regulations, the width of the ROW and minimum distance of the ROW from the center of any road are as follows, for 330 kV transmission lines:

<i>Country</i>	<i>Width of ROW</i>	<i>Min. distance of transmission line From road center</i>
• Ghana	40 meters	50 meters
• Burkina	50 meters	50 meters
• Mali	50 meters	50 meters

#### ***4.2.1.2. Corridor Mapping***

During the study for the selection of the Line Corridor and as part of the Line Route Study Report, the Corridor shall be mapped with GPS and in XYZ coordinate system and the XYZ

data of the Corridor submitted in an appropriate spreadsheet format and GIS format acceptable to the WAPP Secretariat, GRIDCo, SONABEL and EDM-SA. Following the selection of a provisional line route, a list of station numbers, XYZ and GPS coordinates of all traverse points, line angles etc. along the proposed line route shall be submitted in a format acceptable to the WAPP Secretariat and the three concerned utilities. The Consultant shall bear in mind that the information to be submitted shall be used for further detailed survey, subsequent tower spotting on the line and the estimation of medium and low voltage networks. At the end of the study a report on the corridor and a line route map shall be submitted for provisional adoption. The Consultant shall note that the line route could be further modified depending on the outcome of the ESIA study. The Consultant shall also note that the Line route shall be considered as final only after the detailed ESIA has been conducted, adopted by the countries and Funding Agencies and approved by the national Agencies in charge of Environmental Protection through the issuance of Permits.

The Consultant shall note that in Ghana, the land statutory wayleave Act, 1963 establishes a provision for a Wayleave Selection Committee to determine the optimal routing to ensure that the selected wayleaves are consistent with Town and Country Planning Regulations and Local Government Byelaws. The Consultant shall work very closely with, and get guidance from, GRIDCo to ensure full conformity with the requirements. The Consultant shall also note that the scope of work in Ghana includes the application and securing of the wayleave authorization. The Consultant shall consult with GRIDCo before initiating the wayleave application. The same level of attention to existing planning efforts in Burkina Faso will be taken into consideration.

#### ***4.2.1.3.Preparation of Maps and Drawings***

The preparation of maps and drawings shall be in compliance with the requirements of GRIDCo, SONABEL and EDM-SA and shall be GIS-compatible.

##### ***4.2.1.3.1. Line Route and Corridor***

The Consultant shall provide plan-profile of the final line route after approval of this route using the following format:

- Maximum of 4 km or line per drawing
- Plan View: 1:5000, 200 m wide
- Profile: horizontal : 1:5000, vertical: 1:500

The line route shall be drafted as follows:

- A general map showing the line route/right-of-way on topographical sheets on a scale of 1:50,000 and 1:2,500 at heavily inhabited areas
- A Key Map showing the line route, in 4-km sections, on topographical sheets on a 1:50,000 scale.
- A satellite imagery map depicting the line route/right-of-way
- A google Earth file (kmz) and autocad drawings (dwg)

- For Ghana, a general map showing the Way Leave Selection Committee Members.

The Consultant shall confirm with GRIDCo, the Way Leave Committee Members. The Consultant shall note that the general map shall be validated and signed by a licensed Surveyor recognized in Ghana. Twenty (20#) copies of the general map with the wayleave committee members printed on it and duly signed shall be provided by the Consultant.

As part of all versions and quantities of the Line Route Study Report (Draft, Provisional, Final), a map of the entire line route fitted in one (1#) A0 size showing among others, relief features, the key structures indicated above with their GPS coordinates and those of the route and substations, shall be submitted.

In addition, all maps shall be GIS-compatible and submitted in digital form with all required information necessary to incorporate into the WAPP Geographical Information System. These could include but not limited to Mxd files, Shape Files, Rasterdata or similar.

#### **4.2.2. Substation Site Selection**

The scope of services by the Consultant shall include, but not be limited to the following:

- Identification of substation sites (creation and/or extension)
- Detailed survey of substation sites and road access
- Preparation of topographical drawings (lay out)
- Preparation of cadastral map/plan

##### **4.2.2.1. Identification and Study of Substations Sites**

The assignment to be carried out by the Consultant is to identify and study the substation sites in accordance with the requirements and regulations of the concerned utilities and various countries. The outcome of these activities shall be contained in the Line Route Study Report.

The Consultant shall work very closely with the WAPP Secretariat, GRIDCo, SONABEL and EDM-SA to determine appropriate locations for the terminal substations. Ideally, new substation locations should not be less than 500 mts by 500 mts but this shall be subject to confirmation by each concerned utility. All work related to the selection of substations shall be deemed to have been included in the Technical and Financial Proposals of the Consultant

In selecting the substation sites, the following, amongst others, should be considered:

- Minimization of the impact on the physical environment (special-area planning, trees, protected and sacred forests, RAMSAR sites, etc – consideration of Technical, economic, environmental, cultural and social issues.)
- Avoidance or minimization of impacts of physical and/or economic displacements
- Avoidance of areas with large transversal slope;
- Avoidance of inaccessible zones, mountainous areas, protected areas and ecologically sensitive zones
- Minimization of the cost of construction and maintenance of the substation (accessibility etc.)



- Compliance with the local, regional and national development master plans of the built-up areas - Areas marked for future development has to be obtained from the relevant Land use and Spatial Planning Authority Office responsible for the area.
- Guidance from GRIDCo, SONABEL and EDM-SA as appropriate regarding routing and planning standards in Ghana, Burkina and Mali respectively.

Using a multiple-criteria decision analysis (MCDA) approach, the Consultant shall propose and examine alternatives for the Substations and make a justified recommendation on optimal sites that minimizes Environmental and Social Impacts and conform to National, International and Funding Agencies' Guidelines. The justification for the recommended sites should contain among others, an evaluation of the advantages and disadvantages of each alternative of site examined. The proposed optimal site must avoid all environmental and social sensitive areas including protected forests, cultural and heritage sites, and RAMSAR sites. In this regard, the Consultant shall produce environmental sensitivity and development suitability maps and work very closely with designated experts from each national utility. The Consultant shall also carry out public consultations in compliance with the SEP determining the line route and sub-stations sites and shall ensure that these consultations are documented in signed Minutes of Meeting with a verified list of participants. These consultations include presentation and guidance for stakeholders on the use of an agreed grievance mechanism.

A detailed description of the selected site, including photographs, environmental sensitivity and development suitability maps, and GPS coordinates, shall be provided by the Consultant depicting the location of all natural features such as relief features and artificial features as well as all other useful details. The description shall include but not be limited to the location of the various obstacles listed below which should be featured in the drawings/maps:

- a) Man-made structures or features (all types of residential and non-residential structures such as roads, streets, schools, dams, hospitals, offices, commercial buildings, government buildings,
- b) Infrastructure (existing power transmission and distribution lines, existing telephone lines, railroad, footpath and highway crossings, microwave towers, stream crossings etc.)
- c) Physical features (rivers, streams, mountains, valleys, swamps, farmlands, forest reserves etc.)

The description on the substation sites shall in particular provide an exhaustive list of all the local administration areas, provinces, districts and villages where the sites are located. For each of these, the following shall be identified with the support of GIS mapping based on GPS coordinates:

- Boundaries of allocated zones;
- Demarcation of farmlands and potentially affected properties
- Hunting Reserves, Forest Reserves, and/or protected areas
- Cultural, Religious and Heritage Sites including, but not limited to, cemeteries, sacred forests, and culturally significant natural features
- Markets and areas with high population densities in non-allocated areas

#### ***4.2.2.2.Detailed Survey of substation Sites***

The detailed survey shall be conducted upon finalization selection of the line route and the approval of the ESIA by the national agencies in charge of environmental protection and Funding Agencies. The Survey shall be conducted using appropriate survey methods and in accordance with standards in the various countries. The outcome of these activities shall be contained in the Detail Survey Report.

The Works shall involve, but not be limited, to the following:

- Identification including clearing and pillaring with the use of concrete pillars.
- Detailing of roads/lanes, buildings, water bodies and other visible landmarks.
- Drafting and preparation of layout maps as well as plans and profiles drawings.

In carrying out the detail survey, the Consultant shall note the following:

- Reference pillars shall be erected to enable effective checking and vetting of the surveys and drawings. Reference pillars shall be in accordance with specifications provided by the utilities.
- Visibility of the pillars should be maintained at all times.
- The visual nature of the ground shall be noted whether pasture, woodlands, arable, etc, with special reference to such items as marshy, soft ground or rock and other relevant information such as soil instability.
- Ordnance datum shall be the basis for all levels and the level shall be shown at 2-m vertical intervals and at the beginning and end of each section; levels shall be shown of each section and at every obstruction or geographical feature.

A detailed survey report shall be presented to the WAPP Secretariat, GRIDCo, SONABEL and EDM-SA. The report should include, among others:

- Information to facilitate recovery or re-establishing of boundary points in the event of the pillar being destroyed, either by witness pillars or otherwise.
- Detailed list of reference pillars established and how they were established.
- Types of instruments used and their accuracies, standard deviations and variances
- Accuracy of levels
- Field books, computations sheets and all related documentations in hard and soft copies.
- Information identifying the nearest access roads to each substation site.
- Photographs showing the nature of the terrain and confirming the absence of construction (buildings, etc.) on the sites.

#### ***4.2.2.3.Preparation of Topographical Drawings***

The preparation of drawings shall be in compliance with the requirements of GRIDCo, SONABEL and EDM-SA.

The substation site maps shall be drafted as follows:

- A general map showing the location of the substation sites on topographical sheets on a scale of 1:10,000.

The maps shall detail out:

- Relief features including but not limited to hedges, fences, swamps and streams
- Details of obstacles including but not limited to houses, roads, pipelines, bridges, surface nature and the like to a width of 30 m around the substation sites.

#### ***4.2.2.4.Preparation and delivery of a Cadastral Map/Plan***

The Consultant shall, in close collaboration with each of the concerned utilities, prepare a cadastral plan/map of the proposed substation Site. The Consultant shall bear in mind that the cadastral map/plan shall be used by the concerned utilities for land title registration. The Consultant shall note that the cadastral map/plan should be duly signed by a licensed surveyor and approved by the Director of Surveys or his/her Representative. The boundaries of the substation site should be clearly defined by boundary pillars which are assigned with regional numbers from the lands commission.

The Consultant shall deliver seven (7#) Cadastral Map/Plan duly signed and approved.

### **4.3. LIDAR Survey**

Based on the approved provisional line route and selected substation sites, the Consultant shall undertake LIDAR Survey on a 200 m Corridor (100 m each side of the provisional route). The LIDAR survey shall also cover the selected substation sites and its surrounding up to a 200 m. The LIDAR survey shall then be carried out according to the following specifications:

The laser data and the 3D DTM (Digital Terrain Model) shall be:

- Points per Square Meter: 4 to 6 (vegetation dependent)
- Classification: Ground, Non Ground
- Swath Width: 100 m either side of provisional route center line
- Accuracies with Ground Control:
  - X and Y between 15cm -20cm (relative and absolute).
  - Z better than 8cms (relative and absolute).
- Accuracies without Ground Control:
  - X and Y between 15cm and 25cm relative, better than 0.5m absolute.
  - Z better than 8cm relative, better than 0.5m absolute

The Lidar System shall allow a good vegetation penetration in order to obtain the above-mentioned accuracies.

Ground control shall be used with ground control points of at least every 5 km well identifiable on imagery. The Imagery deliverables shall be:

- Pixel size : 10 to 15 cm depending on topography
- Imagery : Geo-referenced coloured ortho-photos

In addition, the Lidar File shall be GIS-compatible and submitted in digital form with all required information necessary to incorporate later on maps/drawings and for the detailed studies on the substation and transmission line design.

#### **4.4. Environmental and Social Impact Assessment (ESIA)**

The work program for the Consultant shall be organised as follows:

- Preparation of Stakeholder Engagement Plan (SEP) for Ghana, Burkina Faso and Mali
- Preparation of Environmental and Social Impact Assessment (ESIA) for Ghana, Burkina Faso and Mali
- Preparation of Resettlement Action Plan (RAP) for Ghana, Burkina Faso and Mali
- Preparation of Illustrative Materials for Ghana, Burkina Faso and Mali
- Public Information and Sensitisation Campaign for Ghana, Burkina Faso and Mali
- Preparation of Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework (RPF) for the Electrification of Communities/Towns/Villages Along Line Route and Around Substations for Ghana, Burkina Faso and Mali.

##### ***4.4.1. Preparation of Stakeholder Engagement Plan (SEP)***

The SEP shall be prepared according to requirements set out in World Bank ESF Environmental and Social Standard 10 Stakeholder Engagement and Information Disclosure. The SEP will focus on identifying stakeholders of the project, and will include a strategy for information disclosure, strategy for consultation, strategy to incorporate the view of vulnerable groups, resources that will be devoted to managing and implementing the SEP, and a monitoring and reporting mechanism. The stakeholders will comprise individuals, groups, local communities, women, youth and any vulnerable groups that may be directly or indirectly affected by the project, positively or negatively. It will identify vulnerable or disadvantaged individuals or groups and their limitations in participating and/or in understanding the project, and it will provide mechanisms to address these limitations. It will explain the opportunities for public consultation and provide a functioning grievance mechanism that includes provision to properly manage possible SEA/SH impacts, including provisions for notification of outcomes once grievances received are processed.

##### ***4.4.2. Preparation of Environmental and Social Impact Assessment (ESIA)***

The ESIA aims at focusing on the implications of the project on the various components of the environment: physical, biological and human components. It shall facilitate the understanding and determination of the likely implications of the proposed project, the relevant considerations, planning and mitigation measures, that shall ensure that the project is implemented in an environmentally and socially sound and sustainable manner. It shall also form the basis for consideration for environmental approval by funding agencies and the issuing of permits from the Environmental Protection Agencies of the three (3) countries for the construction and operation of the transmission line and substations.

The Consultant shall review all necessary data and reports on the proposed Ghana – Burkina – Mali Interconnection Project, and any other additional information that could help in the development of the Environmental Impact Statement (EIS) for Ghana. The Consultant shall review the national and international environmental policies, procedures and legislation and regulatory frameworks as they apply to the assignment. The Consultant shall take into account

the requirements of the various institutions in charge of environmental protection in each country and also the requirements indicated in Appendix 4 and comply accordingly. Requirements of Funding Agencies shall be taken into consideration in the conduct of the ESIA in particular the new World Bank ESF, the General Environmental, Health and Safety Guidelines (EHSGs) and the EHSGs for Electric Power Transmission and Distribution.

As part of the ESIA Study, the Consultant shall be required to undertake a scoping exercise and prepare a Scoping Report (one for each country giving among others, a Project Brief and detailing the “Terms Of Reference” for review, in the form and format required by the authorities in charge of environmental protection in the concerned countries and in line with the prevailing environmental management and protection regulations and laws in the concerned countries. The Consultant shall undertake comprehensive public consultations in compliance with any applicable existing stakeholder engagement plans (SEPs) and/or international standards prior to preparing the Scoping Report and shall ensure that these consultations are adequately documented in the form of signed Minutes of Meeting containing among others, signed lists of participants and photographs. The Consultant shall detail out in the Scoping Reports, the approval processes that lead up to the issuance of the Environmental Permit and reporting requirements in each country. The Consultant shall if required, make a presentation of the Scoping Study to each of the authorities in charge of environmental protection in each of the involved countries prior to the submission of the Scoping Reports. The approval of the Scoping Study by the authorities in charge of environmental protection in each country may be required prior to the submission of the Environmental Impact Statement for the Ghana Report. The Consultant, in collaboration with each national utility, shall be expected to follow-up with the authorities to obtain the approval on the Scoping Report.

It may be necessary that, prior to the approval of the results of the assignment and/or the issuance of an Environmental Permit, the Ministry in charge of Environmental Protection and/or national Agency in charge of Environmental Protection in the three (3) countries shall engage independent auditors at the cost of the Client to verify the results of the Study, which shall also include meetings with the stakeholders, Public Consultations, and intra/inter-ministerial meetings. The Consultant shall be required to take part in all of these meetings at his own expense to among others, deliver presentations and provide clarifications as needed. The Financial Proposal submitted by the Consultant shall be deemed to have included these costs and as such, it shall be assumed that the Consultant has made in-depth investigations of the requirements of each concerned country and any applicable donor and international standards or guidelines prior to submitting Technical and Financial Proposals.

The scope of work of the Environmental and Social Impact Assessment shall include, but not be limited to the following:

- A description of the institutional and legal framework, especially with regards to the conduct of ESIAs in each of the concerned countries and the donor requirements
- A description of the project and works to be conducted
- A description of existing Environment and its initial state
- A study of the variants of the project (Analysis of Alternatives)
- Identification & Assessment of potential negative and positive environmental and social impacts
- Proposal on adequate Mitigation measures

- Preparation of a Provisional Environmental & Social Management Plan (ESMP), to be finalized by the EPC contractor once final/construction designs are available
- Preparation of an Environmental & Social Monitoring Program.
- Public consultations and information.
- Preparation of Illustrative Materials for public consultation needs
- Detailed Proposal, in consultation with each of the ultimate Beneficiaries, on training and capacity building program to be undertaken by the Consultant for the environmental agencies, ministries and utilities based on an assessment conducted by the Consultant that highlights the capacity reinforcements required;
- Opinion on the environmental and social acceptability of the project.

#### ***4.4.2.1. Study of Existing Environment***

A detail study and description of the existing environment (physical, biological and socio-cultural/economy) within the Line Corridor Project's area of potential impacts, effects and substation vicinity shall be provided by the Consultant. These shall include, but not limited, to the following:

##### **a) Physical Environment**

- i. Topography, geology and soils
- ii. Climate and air quality
- iii. Noise
- iv. Ground and Surface water
- v. Electromagnetic Fields

##### **b) Biological Environment**

- i. Terrestrial Vegetation (dominant species and habitats) and endemic and threathend plant species by using biodiversity surveys
- ii. Wildlife and habitats (mammals, birds, reptiles, amphibians and fish by using biodiversity surveys
- iii. Endangered and endemic species, including insects and other endemic or endangered lower life forms
- iv. Ecologically sensitive sites (e.g. wetlands, national parks, forest reserves)

##### **c) Socio-Cultural / Economic Environment**

- i. Population and Demographics
- ii. Ethnic, Religious and Cultural Heritage including shrines and cemeteries
- iii. Historical resources
- iv. Aesthetics and Tourism
- v. Infrastructure and Utilities
- vi. Education and related facilities
- vii. Land tenure and Land Ownership
- viii. Land Use
- ix. Employment/Manufacturing
- x. Agriculture/Livestock
- xi. Ecosystem services
- xii. Public Health (including HIV/AIDS)

#### ***4.4.2.2. Identification & Assessment of Potential Environmental and Social Impacts***

Some environmental and social impacts and effects can occur during the pre-construction, construction, operation and decommissioning phases of the project. The Consultant shall identify the sources of these effects and describe the predicted impacts from these activities during each phase of the three phases of the project. The identification of the direct/indirect, positive/negative, trans-regional, economic and environmental impacts and cumulative impacts should be clearly established using a well-known methodology. The magnitude of the impact will be determined by an overall assessment of how one or several sources of impact affect an environmental and social component. This assessment considers the measures already applied at the project's design phase to optimize the transmission line's alignment and evaluates the impact's magnitude based on three criteria (intensity, extent and duration) and on the implementation of the proposed mitigation measures. Impact magnitude would be determined to be major, moderate, or minor in nature.

Different strata of society - men, women, vulnerable groups (age, ethnicity, poverty, disability, etc.) will be affected differently by the project, both negatively and positively. The Consultant must identify positive and negative impacts on the different cross-sections of society, paying specific attention to avoiding or minimizing negative impacts of the project on women, youth and groups that the consultant identifies as particularly at risk (i.e. vulnerable groups). Special measures including those to prevent and manage GBV/SEA-SH shall also be taken to ensure women, youth and vulnerable groups have an opportunity for active participation in consultations and their needs and concerns are documented and addressed separately. The Consultant shall elaborate on the gender and socially inclusive methodology to be employed in the impact assessment study.

The gender and socially inclusive methodology referenced above will also be applied to the process of estimating impacts related to involuntary resettlement, land use and land acquisition. This estimate will use analysis conducted over the course of the ESIA task to provide preliminary estimates of properties and populations potentially subject to involuntary resettlement, land use and/or land acquisition. The estimates presented in the ESIA will concern numbers of potentially affected entities, as well as preliminary budget estimates associated with potential resettlement activities.

The Consultant shall evaluate the benefits of the project for the three (3) countries and their populations, the impact of the project on development sustainability, its contribution towards poverty alleviation, and the attainment of the Sustainable Development Goals (SDGs). Particular attention shall be made to identifying and enhancing project benefits for women, youth and vulnerable groups. The Consultant shall in particular, evaluate the short-term and long-term job creation potential of the project especially for the youth and women as well as identify gender, complaints management, GBV/SES-SH, child labor and forced works issues related to the short-term construction and long-term economic growth/poverty reduction potential in conformity with the relevant directives issued at the regional and continental levels in addition to the requirements of the involved Funding Agency(ies).

#### ***4.4.2.3. Mitigation Measures***

The Consultant shall propose mitigation measures for the potential environmental and social effects that would occur from pre-construction, construction, operational and decommissioning activities. He shall classify and evaluate the residual impacts and, if necessary, provide compensation measures for significant residual impacts. The mitigation measures should be proposed by phase of the project and should be in line with national and Funding Agencies' requirements and guidelines.

#### ***4.4.2.4. Risk and Accident Management***

The Consultant will proceed to estimate the following risks and propose adequate E&S and H&S implementation arrangements for the ESMP and OHS Plan:

- potential accident hazards when using the loading and evacuation equipment of transport materials and equipment and how to prevent these accidents; etc.;
- analysis of the utility's safety, health and environment policy, highlighting the code of good environmental and safety practices: does the utility have an Occupational Health and Safety Plan and ISO 45001, OHSAS 18001:2007 or NEBOSH or similar certified OHS specialists and qualified Environmental and Social Specialists;
- does the utility have an Environmental and Social Management System (ESMS);
- Contractor needs to prepare and implement his own Construction Environmental and Social Management Plan (CESMP) and Occupational Health and Safety Plan (OHSP) and recruit for this purpose qualified Environmental and Social Specialists and ISO 45001, OHSAS 18001:2007 or NEBOSH or similar OHS Specialists;
- Supervising Engineer will need to supervise the adequate preparation and implementation of the CESMP and OHSP and will need to recruit for this purpose the same specialists with the same qualifications as the Contractor; Environmental and Social and Occupational Health and Safety monitoring program to ensure integrity and safety of the site;
- risk management program (protection of staff, consultation or medical follow-up of employees, adequate training);
- list of rules or codes of practice as a reference;
- the development of an emergency plan in the event of an accident. This plan must identify emergency situations and emergency responses. This plan should include (security measures in force on the site, intervention structures, emergency and decision-making mechanisms within the construction company, the internal and external communication mode, etc.).

#### ***4.4.2.5. Provisional Environmental & Social Management Plan (ESMP)***

The Consultant shall identify personnel and environmental and social management and training requirements for each stage of the project development and develop a Provisional Environmental & Social Management Plan (ESMP) as part of the overall ESIA report.

The ESMP shall include an appropriate monitoring program to determine impacts on the physical, biological and human environments. This program shall be used to verify whether predictions of environmental and social impacts, developed in the design phase, are accurate and that unforeseen impacts are detected at an early stage. This shall allow corrective measures to be implemented before significant damage takes place. The monitoring plan should specify what shall be



monitored (indicators), when, by whom and the cost implications (investment cost and recurrent costs). The ESMP shall include a Vegetation Management Plan as well as a plan for the Management of Archaeological and Cultural Property, a plan for solid/liquid waste management, a plan for haz mat management, a plan for occupational health and safety, labor management procedures including a GRM for all direct and contracted workers, Code of Conduct, including measures to prevent and manage Gender Based Violence/Sexual Exploitation and Abuse/Sexual Harassment risks, protect child labor and forced works, a functioning Grievance Redress Mechanism for local communities and other stakeholders in accordance with ESS10 requirements (consult the World Bank ESF requirements and guidance notes).

The Consultant shall take into consideration lessons learnt from similar ESIA's done on similar projects and shall reflect such in the ESMP. It is hoped that the information gained from a well-designed monitoring program shall be useful in refining future designs to be more cost-effective and have fewer, and less serious environmental, social and health and safety impacts.

#### ***4.4.2.6. Public Consultations and Information***

The Consultant shall be required to prepare and implement a Stakeholder Engagement Plan (SEP) undertake consultations throughout the entire study with a number of relevant agencies including relevant Government Ministries, Non-Governmental Organizations (NGOs), affected communities including vulnerable groups, Local and Regional Authorities and the public regarding the proposed project. The consultations will ensure that a representative cross-section of the key stakeholders is present, and ensure that women, youth and vulnerable groups are represented in the consultative process. The Consultant shall also be required to undertake public consultations especially during the preparation of the Scoping, Line Route, ESIA, ESMP and the RAP reports. Particular attention will be paid to undertake strong consultations and participation with women's groups, youth, disabilities, groups that advocate for children and adolescent rights and other stakeholders by providing a safe enabling environment for open and separate conversation on social risks management mainly issues related to GBV/SEA-SH.

All site visits by the Consultant shall have representations from the national utilities. However, it is the responsibility of the Consultant to ensure that all civil society, potential affected peoples and grassroots stakeholders are included in the process.

All the consultations shall be adequately documented in the form of **signed** Minutes of Meeting containing signed lists of participants, dates, pictures, discussion/minutes and other records of such consultations. All submitted reports shall contain scanned copies of the signed Minutes of Meeting.

The Consultant shall be required to prepare a non-technical summary report of the impact assessments in the local languages in the areas involved as mandated by applicable guidelines. The Consultant shall also be required to organise informative meetings with the communities impacted by the project after the affected communities, Impact Assessment Study Final Report has been adopted.

#### ***4.4.2.7. Determination of Compensation from Acquisition of Right-of-Way***

It is expected that the utilities or other appropriate agency in the various countries shall acquire the Right-Of-Way (ROW) in the project area for the smooth implementation and operation of the line.

The acquisition of all rights-of-way shall take into consideration environmental and social factors and in particular, the outcome of the ESMP and RAP. The land acquisition procedures shall be carried out in accordance with national and international regulations, specially World Bank Environmental and Social Standard 5 (ESS5). The environmental and social impact of the project shall also be minimized through measures such as impact consideration in siting and design, restricting right-of-way use by un-authorized persons, erosion and sediment control during and after construction, and use of low impact maintenance procedures.

Following consultations, the ESIA shall provide information regarding the potential acquisition of the rights-of-way, their lengths, general locations and the local and national / international policies and requirements regarding acquisition of these rights-of-way.

The Consultant shall undertake a detailed survey of the entire ROW and provide information on affected individual and community properties, forest reserves and compensation packages that may be required for the acquisition of the rights-of-way in the ESIA. In this regard, a geo-referenced Property Impact Record (PIR) shall be prepared as part of the ESIA but as a stand-alone report with clear, justifiable cut-off dates for the compensation. The PIR shall include but not be limited to:

- An exhaustive list of all of the Owners of private properties (including trees, farms, plantations, traditional land, and similar) together with their addresses and identity cards (physical persons)
- A description of the location of all of these properties including GPS coordinates
- The quantity, quality and nature of properties of each of the Owners
- The quantities of trees, broken down by type, in protected areas (Forest Reserves and Parks) and within the corridor.
- The approximate dimension, age, and health of the trees in addition to any other information that would facilitate their valuation for the purposes of compensation
- The unit price and total cost of public and private properties in line with national legislation and for validation by the concerned national utility.

In noting that the PIR shall also be an input for the preparation of the Resettlement Action Plan, the Consultant shall also include, but not limited to, for each Project Affected Person (PAP):

- number of wives
- number of children below 18 years
- number of children above 18 years
- number of children still in school and above 18 years
- number of other persons living with PAP
- number of handicapped persons living with PAP
- estimation of annual family income, precising the source(s) of income(s)

Particular attention shall be paid to sensitive locations such as communities or private land/space use (sacred sites, sacred trees and woods, cultural and scientific sites, etc.), properties with title and without title deeds. In each village/community, the inventory shall be done in the presence of the national utility, local authorities and local chiefdoms if present. The Financial Proposal submitted by the Consultant shall be deemed to have included the costs of participation of 1 Representative from the national utility, 1 Representative from the local administration and

1 Representative from the local chiefdom. The outcomes of all visits related to the preparation of the PIR shall be contained in Minutes of Meeting signed by each participant and the Consultant.

The Consultant shall submit for approval by the national utilities, a sample Inventory Form that shall be used to collect information for the preparation of the PIR. As part of submission of the PIR as well as the Final Report on the Resettlement Action Plan (RAP), the Consultant shall submit in form, format and content acceptable to the Client and the Funding Agency(ies), the complete database of the information collected within the framework of preparing the PIR and the RAP.

#### ***4.4.3. Preparation of a Resettlement Action Plan***

The Consultant shall prepare an acceptable RAP based on the most recent and accurate information on affected populations. The Consultant shall be assisted by a Surveyor to localize the limits of the provisional Line Route through the GPS coordinates already established for the corridor. The Consultant shall familiarize himself with the requirements of the national agencies and Funding Agencies in preparing RAPs and ensure full adherence. The RAP shall provide clear and verifiable information on the Project Affected Persons (PAPs) including vulnerable groups with clear, justifiable cut-off dates for the compensation. Specifically, the Consultant is expected to:

- Prepare the RAP based on a detailed census of directly affected persons who may be relocated, or whose incomes or livelihoods may be displaced, by the project, and conduct a valuation of the assets and incomes. Particular attention shall be paid to women and children as well as disabilities, ethnic minority, etc.;
- Describe the policy and regulatory context (e.g. laws, regulations, and procedures) of the Governments of all the three (3#) countries on resettlement, and demonstrate their relevance to the most recent appropriate African Development Bank policy and World Bank ESS5 on land acquisition, land use and involuntary resettlement covering physical and economical displacement;
- Identify clearly negative impacts
- Determine the compensation and other resettlement assistance;
- Conduct consultations with identified project affected persons (PAPs) about the resettlement and other acceptable alternatives; Assist the implementing agency and local leaders in establishing the institutional set up for decision making and responsibilities for RAP implementation and procedure for grievance redress;
- Provide RAP implementation calendar; and
- Develop arrangements for RAP monitoring and evaluation, including completion of a baseline socio-economic survey of PAPs and host communities.

The following sections of the RAP correspond to the scope of work to be completed by the Consultant.

- *Description of the project:* General description of the affected areas.
- *Potential Impacts:* Identification of the: (i) components or activities that require resettlement or restriction of access, including access roads and borrow pit area, etc.; (ii) zone of impact of components or activities; (iii) alternatives considered to avoid or minimize resettlement or restricted access; and (iv)

mechanisms established to minimize resettlement, displacement, and restricted access, to the extent possible, during project implementation.

- *Objectives:* The main objectives of the resettlement program as these apply to the [name of project] should be described in relation to the project.
- *Socio-economic studies:* The findings of socio-economic studies to be conducted with the involvement of potentially affected people shall be needed. These generally include the results of a census of the PAPs covering:
  - a) Current occupants of the affected area as a basis for design of the RAP and to clearly set a cut-off date, the purpose of which is to exclude subsequent inflows of people from eligibility for compensation and resettlement assistance;
  - b) Standard characteristics of displaced households, including a description of production systems, labor, and household organization; and baseline information on livelihoods (including, as relevant, production levels and income derived from both formal and informal economic activities) and standards of living (including health status) of the displaced population;
  - c) Magnitude of the expected loss, total or partial, of assets, and the extent of displacement, physical or economic;
  - d) Information on vulnerable groups or persons, for whom special provisions may have to be made; and
  - e) Provisions to update information on the displaced people's livelihoods and standards of living at regular intervals so that the latest information is available at the time of their displacement, and to measure impacts (or changes) in their livelihood and living conditions.

There may be other studies that the RAP can draw upon, such as those describing the following, as needed:

- Land tenure, property, and transfer systems, including an inventory of common property natural resources from which people derive their livelihoods and sustenance, non-title-based usufruct systems (including fishing, grazing, or use of forest areas) governed by local recognized land allocation mechanisms, and any issues raised by different tenure systems in the sub project area;
- Patterns of social interaction in the affected communities, including social support systems, and how they shall be affected by the sub-project;
- Public infrastructure and social services that shall be affected; and
- Social and cultural characteristics of displaced communities, and their host communities, including a description of formal and informal institutions.

These may cover, for example, community organizations; cultural, social or ritual groups; and non-governmental organizations (NGOs) that may be relevant to the consultation strategy and to designing and implementing the resettlement activities.

- *Legal Framework:* The analysis of the legal and institutional framework in Ghana, Burkina and Mali should cover the following:
  - a) Scope of existing land and property laws governing resources, including state-owned lands under eminent domain and the nature of compensation associated with valuation methodologies; land market; mode and timing of payments, etc;
  - b) Applicable legal and administrative procedures, including a description of the grievance procedures and remedies available to PAPs in the judicial process and the execution of these procedures, including any available alternative dispute resolution mechanisms that may be relevant to implementation of the RAP for the sub-project;
  - c) Relevant laws ( including customary and traditional law) governing land tenure, valuation of assets and losses, compensation, and natural resource usage rights, customary personal law; communal laws, etc. related to displacement and resettlement, and environmental laws and social welfare legislation;
  - d) Laws and regulations relating to the agencies responsible for implementing resettlement activities in the sub-projects;
  - e) Gaps, if any, between local laws covering public expropriation and ESS 5 requirements regarding World Bank's ESF and other donor's resettlement policies, and the mechanisms for addressing such gaps; and
  - f) Legal steps necessary to ensure the effective implementation of RAP activities in the sub-projects, including, as appropriate, a process for recognizing claims to legal rights to land, including claims that derive from customary and traditional usage, etc. and which are specific to the sub-projects.
- The institutional framework governing RAP implementation generally covers:
  - a) Agencies and offices responsible for resettlement activities and civil society groups like NGOs that may have a role in RAP implementation;
  - b) Institutional capacities of these agencies, offices, and civil society groups in carrying out RAP implementation, monitoring, and evaluation; and
  - c) Activities for enhancing the institutional capacities of agencies, offices, and civil society groups, especially in the consultation and monitoring processes.

- *Eligibility and entitlements:* Definition of displaced persons or PAPs and criteria for determining their eligibility for compensation and other resettlement assistance, including relevant cut-off dates. This is based on the definition of the TL right-of-way (RoW), which is specified by utilities as 50 meters horizontal. The vertical clearance from the closest physical structure to the TL conductor shall be as per the standards and practices of the utilities... Agricultural activities below this vertical clearance below this vertical clearance, and those that do not hamper access to the TL (normally trees up to 5 meter height are allowed), may remain under the TL provided that agreed and appropriate conditions are met (e.g. no burning; no planting of crops or trees that would exceed the vertical clearance; access boundaries around the 5 meter perimeter of each tower). Buildings are prohibited under the line. Land needed for the sub-station and access roads and borrow pit areas shall need to be cleared as part of the RoW.
- *Valuation of and compensation for losses:* The methodology to be used for valuing losses, or damages, for the purpose of determining their replacement costs; and a description of the proposed types and levels of compensation consistent with national and local laws and measures, as necessary, to ensure that these are based on acceptable values (e.g. market rates).
- *Resettlement Measures:* A description of the compensation and other resettlement measures that shall assist each category of eligible PAPs to achieve the resettlement objectives. Aside from compensation, these measures should include programs for livelihood restoration, grievance mechanisms, consultations, and disclosure of information.
- *Site selection, site preparation, and relocation:* If a resettlement site is an option, describe the alternative relocation sites as follows:
  - a) Institutional and technical arrangements for identifying and preparing relocation sites, whether rural or urban, for which a combination of productive potential, locational advantages, and other factors is at least comparable to the advantages of the old sites, with an estimate of the time needed to acquire and transfer land and ancillary resources;
  - b) Any measures necessary to prevent land speculation or influx of eligible persons at the selected sites;
  - c) Procedures for physical relocation under the project, including timetables for site preparation and transfer; and
  - d) Legal arrangements for recognizing (or regularizing) tenure and transferring titles to resettlers.
- *Housing, infrastructure, and social services:* Plans to provide (or to finance resettler's provision of) housing, infrastructure (e.g. water supply, feeder roads), and social services to host populations; and any other necessary site

development, engineering, and architectural designs for these facilities should be described.

- *Environmental protection and management.* A description of the boundaries of the relocation area is needed. This description includes an assessment of the environmental and social impacts of the proposed resettlement and measures to mitigate and manage these impacts (coordinated as appropriate with the environmental assessment of the main investment requiring the resettlement).
- *Community Consultation and Participation:* Consistent with the Funding Agencies's policy on consultation and disclosure, a strategy for consultation with, and participation of, PAPs and host communities, as described in the SEP, should include:
  - a) Description of the strategy for consultation with and participation of PAPs and hosts in the design and implementation of resettlement activities;
  - b) Summary of the consultations and how PAPs' views were taken into account in preparing the resettlement plan; and
  - c) Review of resettlement alternatives presented and the choices made by PAPs regarding options available to them, including choices related to forms of compensation and resettlement assistance, to relocating as individual families or as parts of pre-existing communities or kinship groups, to sustaining existing patterns of group organization, and to retaining access to cultural property (e.g. places of worship, pilgrimage centers, cemeteries); and
  - d) Arrangements on how PAPs can communicate their concerns to project authorities throughout planning and implementation, and measures to ensure that vulnerable groups (including indigenous peoples, ethnic minorities, landless, children and youth, and women) are adequately represented.
- The Consultations should cover measures to mitigate the impact of resettlement on any host communities, including:
  - a) Consultations with host communities and local governments;
  - b) Arrangements for prompt tendering of any payment due the hosts for land or other assets provided to PAPs;
  - c) Conflict resolution involving PAPs and host communities; and
  - d) Additional services (e.g. education, water, health, and production services) in host communities to make them at least comparable to services available to PAPs prior to resettlement.
- *Grievance procedures:* The RAP should provide mechanisms for ensuring that an affordable and accessible procedure is in place for third-party settlement of disputes arising from resettlement. These mechanisms should take into account the availability of judicial and legal services, as well as community and traditional dispute settlement mechanisms. The Consultant shall also review Best Practices in this matter and integrate into his Proposal where

possible.

- *RAP implementation responsibilities:* The RAP should be clear about the implementation responsibilities of various agencies, offices, local representatives and also take into consideration the adopted implementation strategy/institutional framework for the project. The RAP shall depict a step-by-step process of how the compensation shall be implemented in each concerned country. These responsibilities should cover (i) delivery of RAP compensation and rehabilitation measures and provision of services; (ii) appropriate coordination between agencies and jurisdictions involved in RAP implementation; and (iii) measures (including technical assistance) needed to strengthen the implementing agencies' capacities of responsibility for managing facilities and services provided under the project and for transferring to PAPs some responsibilities related to RAP components (e.g. community-based livelihood restoration; participatory monitoring; etc.).
- *Implementation Schedule:* An implementation schedule covering all RAP activities from preparation, implementation, and monitoring and evaluation should be included. These should identify the target dates for delivery of benefits to resettlers and hosts and a clearly defined closing date. The schedule should indicate how the RAP activities are linked to the implementation of the overall project.
- *Costs and budget:* The RAP for the specific sub-projects should provide detailed (itemized) cost estimates for all RAP activities, including allowances for inflation, population growth, and other contingencies; timetable for expenditures; sources of funds; and arrangements for timely flow of funds. These should include other fiduciary arrangements consistent with the rest of the project governing financial management and procurement.
- *Monitoring and evaluation:* Arrangements for monitoring and evaluation of RAP activities by the implementing agency, and the independent monitoring of these activities, should be included in the RAP section on monitoring and evaluation. The final evaluation should be done by an independent monitor or agency to measure RAP outcomes and impacts on PAPs' livelihood and living conditions. The Funding Agencies have examples of performance monitoring indicators to measure inputs, outputs, and outcomes for RAP activities; involvement of PAPs in the monitoring process; evaluation of the impact of RAP activities over a reasonable period after resettlement and compensation, and using the results of RAP impact monitoring to guide subsequent implementation.

In preparing the draft RAP, the Consultant shall hold consultation meetings with all stakeholders including the relevant Government Ministries, national Agencies, local authorities, NGOs, Governors, Mayors, Prefects, community/village leaders, other recognized authorities in each of the concerned countries, and PAPs to ensure that their views are adequately incorporated in the report. These consultation meetings shall be adequately documented as previously indicated.



As part of the Scoping Report, the Consultant shall submit for the approval of the national utilities, the sample Questionnaires that shall be used to conduct the socio-economic studies.

#### ***4.4.4. Preparation of Illustrative Materials***

The Consultant shall include relevant maps, plans, tables, graphs, diagrams, GIS analysis and any other illustrative material that facilitate communication and understanding of ESIA findings and conclusions. These materials shall show aspects related to environmental and social issues/risks in the potentially affected landscape, and possible restoration / mitigation measures proposed for the study area. Examples of features that could be represented on the maps include:

- a. Communities, and associated land use patterns (agricultural, pastoral, etc.)
- b. Ecological zones (grassland, wetland, forest, protected areas, etc.),
- c. Natural resources
- d. Places of historic and cultural interest,
- e. Known hazard zones (floods, landslides, etc.).

#### ***4.4.5. Public Consultations during the Study***

The Consultant shall carry out public consultations throughout the entire study. All the costs associated with the organization of these consultation and the prospective participation of stakeholders shall be supported by the Consultant. The financial proposal of Financial Proposal submitted by the Consultant shall be considered deemed to have incorporated included these costs and, in this regard as such, it shall be assumed that the Consultant has thoroughly investigated made in-depth investigations of the requirements of each concerned country and any applicable international standards or guidelines prior to the submission of the technicals submitting Technical and financial proposals. Financial Proposals.

#### ***4.4.6. Public Information and Sensitisation Campaign***

At the end of the study and elaboration of various reports approved by the relevant authorities in the concerned countries, the Consultant shall prepare a non-technical summary report of the impact assessments in the official languages of the countries and in the local languages prevailing in the areas crossed by the interconnection lines.

The Consultant shall carry out information and sensitization campaigns targeting directly and indirectly affected populations, as well as public and private entities within the areas traversed by the interconnection line. The campaigns shall be undertaken in compliance with the SEP, in the official languages of the involved countries and in the local languages within the areas traversed by the interconnection line. The public information and sensitization campaigns shall address issues related but not be limited to:

- Project planning, implementation, and monitoring.
- Potential project benefits for the three (3) countries and their populations,
- Environmental and social impacts of the project,

- Socialization and distribution of applicable RAPs prepared for the Project, Community electrification
- Dangers and safety measures related to the interconnection line

The Consultant shall propose an appropriate approach and methodology that shall comply with applicable international standards and any approved SEPs, and be approved by institutions in charge of environmental protection in the three (3) countries. The Consultant shall prepare, deliver and distribute appropriate presentation material including the Non-Technical Summary Report written in the local language(s) in the areas traversed by the project. The Consultant shall propose a medium acceptable to the utilities and institutions in charge of environmental protection in the three (3) countries for the informative and sensitization campaign. The Consultant shall assume in their proposal that a minimum of one (1) week shall be spent in the areas impacted by the project in each of the three (3) countries and shall cover his own cost. The Client shall support the costs associated with organizing the campaigns and the costs of participation of Representatives from concerned utilities, Ministries in charge of Energy, Ministries in charge of Environment, Ministries in charge of Interior Affairs, and WAPP Secretariat. At the conclusion of the Campaign, the Consultant shall prepare a Report detailing among others, the conduct and outcomes of the exercise as well as the Participants in attendance.

#### ***4.4.7. Identification of Communities/Towns/Villages along Line route and around substations***

The Consultant shall note that all villages/towns/communities that are 5-km on each side of the line corridor and containing between 500 to 2,500 inhabitants along the entire length of the line. It is envisaged that the same shall be done for villages/towns/communities around the identified substations. As such, upon adoption of the provisional Line route, the Consultant shall catalogue all eligible villages/town/communities in a separate volume of the Final Report on the Provisional Line Route, describing among others, their distance from the proposed line route/substation and population. The consultant shall also survey all the existing Medium Voltage network around the identified villages/town/communities. The outcomes of this work shall be submitted in a separate Report that shall be considered and validated by a meeting of the Stakeholders that the Consultant shall participate in. The report shall include an understanding map with (i) the line routing of the GBM with the substations (ii) the identified villages/town/communities and (iii) the existing Medium Voltage network that will be used to identify and analyse the optimal technology mode for the electrification.

#### ***4.4.8. Identification and mapping of provisional line routes for the medium voltage networks and substation locations***

Once the technology mode has been adopted by the stakeholders, the Consultants shall conduct field trips with the participation of the concerned utilities/institutions to identify the most optimal provisional line routes for the medium voltage networks as well as locations for the required medium voltage substations in conformity with Sections 4.2.1 and 4.2.2 of these Terms of Reference. In this respect, the Consultant shall note that the ROW for 33 kV lines shall be 3 meters, and where necessary, be at least 1.5 meters from the edge of a road. During the study to identify the most optimal provisional line routes for the medium voltage networks as well as locations for the required medium voltage substations, the corridor shall be mapped with GPS and in XYZ coordinate system. The Consultant shall prepare a Report that describes the provisional line routes as well as provide the XYZ data of these routes in an

appropriate spreadsheet format acceptable to the WAPP Secretariat, GRIDCo, SONABEL and EDM-SA. The Consultant shall bear in mind that the information to be submitted shall be used for further detailed survey, subsequent tower spotting on the line and the estimation of medium and voltage networks. In the description, the Consultant shall depict the location of all natural obstacles such as relief features and artificial obstacles as well as all other useful details. The description shall include but not be limited to the location of the various obstacles listed below which should be featured in the drawings/maps:

- a) Man-made structures or obstacles (all types of residential and non-residential structures such as roads, streets, schools, dams, hospitals, offices, commercial buildings, government buildings,
- b) Infrastructure (existing power transmission and distribution lines, existing telephone lines, railroad, footpath and highway crossings, microwave towers, stream crossings etc.)
- c) Physical features (rivers, streams, mountains, valleys, swamps, farmlands, forest reserves etc.)

The following shall be identified with the support of GPS coordinates:

- Boundaries of allocated zones;
- Demarcation of farmlands and potentially allocated properties
- Hunting Reserves, protected areas and Forest Reserves
- Cultural, Religious and Heritage Sites including Cemeteries
- Markets and areas with high population densities in non-allocated areas

The Consultant shall note that the line routes shall be considered as final only after the detailed ESIA has been conducted, adopted by the countries and Funding Agencies and approved by the national Agencies in charge of Environmental Protection through the issuance of Permits.

#### ***4.4.9. Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework (RPF) for the Electrification of Communities/Towns/Villages Along Line Route and Around Substations for Ghana, Burkina Faso and Mali***

As a Social Mitigation Measure and to increase acceptability of the project by the populations in the vicinity of the project, it is envisaged that eligible communities/towns/villages in proximity of the line route will be considered for electrification. This electrification could be done through conventional means (medium voltage outlets from the Substations to be constructed under the project), extensions from nearby distribution systems, and/or shield-wire systems (SWS).

An Environmental and Social Management Framework (ESMF) and a Resettlement Policy Framework (RPF) shall be prepared for the electrification of communities/towns/villages for Ghana, for Burkina and for Mali.

The outcomes of this work shall be contained in separate ESMF and RPF Reports, which is part of the main Environmental and Social Impact Assessment and RAP but in separate volumes.

The Environmental and Social Management Framework (ESMF) shall establish an environmental and social screening process that shall enable the structures in charge of

implementing the electrification of Communities/Towns/Villages to identify, assess and mitigate the potential environmental and social impacts of the project activities at the planning stage.

The environmental and social review procedure of the ESMF shall be integrated into the general procedure for the approval and financing of activities. The implementation of the ESMF shall take into account the safeguard policies of the Donors, in particular the World Bank, and shall be in compliance with the environmental laws of the countries concerned for each activity. The ESMF shall also determine the institutional arrangements to be made during the implementation the electrification, including those related to capacity building.

The ESMF shall provide procedures, methodologies and management criteria to adequately address the environmental and social aspects of electrification of communities/towns/villages.

#### ***4.4.9.1.Environmental and Social Management Framework***

The Consultant shall produce an Environmental and Social Management Framework (ESMF) that shall provide an initial assessment of the positive and/or negative environmental and social risks, issues and impacts of community/local electrification and establish a dialogue between the environmental and social experts and the technical experts to optimize the project design. This includes avoiding negative impacts as much as possible, thus ensuring that the technical variants studied integrate environmental and social concerns.

On the basis of existing documentation, field visits and meetings with the main stakeholders concerned by the project, the summary impact study should provide an initial assessment of the environmental and social risks and the main mitigation or compensation measures.

To this end, the Consultant shall carry out the following tasks:

- Description of the project
- Description of the legal and regulatory framework (i) explaining the content of applicable national laws and regulations and their consequences for the project, (ii) analyzing the gaps between national laws and regulations and donor requirements and (iii) proposing appropriate measures to reduce or eliminate these gaps.
- Justification of the choice of project (alternative/variant selected).
- Background information on the biophysical and socio-economic framework in the project's likely areas of influence.
- GIS mapping showing the main environmental and social issues to be addressed by the project in the study area.
- Identification of the main issues and potential E&S impacts with respect to the activities and works envisaged within the framework of the project.
- Presentation of the mitigation measures envisaged to avoid, reduce or even compensate for the potential negative E&S impacts of the project.
- Description of a general monitoring-evaluation mechanism to be put in place in order to assess the proper implementation of the mitigation measures.
- Description of the principles, rules, methodologies, tools and practical modalities for the preparation, approval and execution of the actions that will remain to be carried out to finalize the detailed environmental and social impact assessment of the project.

- Description of the envisaged institutional framework detailing the roles and responsibilities of the actors involved in the finalization of the detailed impact assessment.
- Identification of training and organizational and operational capacity building needs.
- Estimation of the provisional budget for the implementation of E&S impact mitigation and monitoring measures.
- Public consultations on the project and on the CGES
- Elaborate a Framework Plan for Environmental and Social Management (PCGES)
  - Procedures for the preparation and implementation of community/local electrification activities
  - Implementation of the environmental and social selection process for the electrification of communities/localities
  - Elaboration, validation and dissemination of ESIA's
  - Implementation monitoring and follow-up
  - Responsibilities of the actors
- The terms of reference for the Environmental and Social Impact Assessment (ESIA) of the project in its Detailed Design Phase.

#### ***4.4.9.2.4.4.9.2 Resettlement Policy Framework (RPF)***

The Consultant will produce a relocation policy framework which will be organized according to the points defined above. As the electrification of communities/localities along the interconnection line is not precisely defined, the CPR will provide a first assessment of the risks related to involuntary resettlement, physical or economic, caused by the project.

On the basis of existing documentation, field visits and meetings with the main stakeholders concerned by the project, the CPR should provide an initial assessment of the risks associated with involuntary resettlement, the main measures to be implemented and the procedures to be followed to carry out future due diligence on involuntary resettlement.

To this end, the Consultant shall conduct the following investigations:

- A brief description of the project and the components involving involuntary resettlement of populations.
- The principles and objectives governing the preparation and approval of the RAP.
- A first estimate of the total number of people to be displaced.
- An identification of the categories to which they are likely to belong and the criteria for belonging to these categories.
- A presentation of the legal framework (i) explaining the content of applicable national laws and regulations and their consequences for displacement, (ii) analyzing gaps between national laws and regulations and donor requirements, and (iii) proposing appropriate measures to reduce or eliminate these gaps.
- A presentation of the methods that will be used to assess lost assets and impacts on the standard of living and livelihoods of affected populations (IDPs and host communities).

- A description of the organizational procedures envisaged for the allocation of rights, assistance and support (eligibility matrix).
- A presentation of the measures envisaged to help the affected populations in their efforts to restore or even improve their livelihoods. The RPF endeavors to describe the methods and procedures by which the affected communities identify and choose the various possible compensation measures, as well as the methods and procedures by which the members of the affected communities themselves will be able to exercise a choice among the various possible options.
- A description of the conditions for implementing the relocations under the Resettlement Action Plan (RAP) and their coordination with the progress of the execution of the work planned under the project.
- A description of the mechanisms for recourse, complaint resolution and compensation for damages.
- A description of the mechanisms for resolving any conflicts that may arise within or between affected communities (between displaced populations and host communities in particular). This may include conflicts over restrictions on the use of resources or grievances that may arise from affected people who are dissatisfied with the eligibility criteria, collective planning measures and/or the implementation of the RAP.
- A description of travel funding arrangements including cost estimates, cash flow and contingency provisions.
- A description of the mechanisms for consultation and participation of displaced populations and host communities in the planning, preparation, implementation and monitoring of the RPF and then the RAP.
- The monitoring-evaluation mechanism implemented by the agency in charge of implementing the RAP(s) and the independent audit mechanism.
- The Terms of Reference of the RAP to be carried out at a later date.

#### **4.5. Feasibility Study Including Technical, Financial and Economic Analyses**

The Scope of Services shall consist of:

- A technical study on the interconnection.
- Economic and financial analyses including sensitivity analyses and a tariff proposal.
- Project Packaging and Preparation of Pre-Qualification (if required) and Bidding Documents.

##### ***4.5.1. Technical study on the interconnection.***

The planning studies shall consider the relevant networks (existing and planned including generation) in Ghana, Burkina, Mali and neighbouring countries (Cote d'Ivoire, Guinea, Togo/BeninBénin, OMVS, OMVG) and recommend any additional facilities that would be necessary to promote exchanges of power among the three (3) countries and other WAPP networks. This shall include the necessary network reinforcements to be made in each of the

countries to ensure unconstrained power exchanges among the countries and/or increase the capacities of the national networks to absorb the power coming from the Interconnection.

The scope of services to be provided by the Consultant under this phase shall include, but not be limited to the following:

- System Analyses
- Assessment of line voltage

The Consultant shall perform planning studies, which shall seamlessly integrate the Ghana – Burkina – Mali Interconnection Project into the WAPP interconnected system to determine the impact of the line on system operation and power exchanges among the three (3) countries and the WAPP interconnected system over a planning horizon of 20 years and 5-yr intervals. The Consultant shall analyse the impact of the project on the existing networks in Ghana, Burkina and Mali. The Consultant shall also evaluate the impact of the Ghana – Burkina – Mali Interconnection Project on the WAPP Interconnected System. Furthermore, the Consultant shall analyse the adequacy of the existing transmission and generation capacities and the transmission and generation expansion plans of the three (3) countries over the planning horizon and make recommendation(s) on reinforcement projects required. In this context, the Consultant shall assess the technical and financial impact of a change in line voltage level from 330 kV or more to determine the optimal voltage level to ensure power transfer over the period of the study. The Consultant shall take into account, among others, that part of this interconnection line which will eventually be integrated into the East-West Backbone as provided for in the WAPP Master Plan to link Dakar in Senegal to Shiroro in Nigeria with the Median Backbone.

The Consultant shall provide at the very least, a cost estimate and implementation schedule for each reinforcement identified. The Consultant should also investigate the possibility of other alternatives that could result in the least cost interconnection among Ghana, Burkina and Mali.

The Consultant shall undertake, among other things, the following:

- Review of data on generation and transmission facilities including communications and SCADA systems in the interconnected networks of the three (3) countries.
- Perform load flow calculations to establish the maximum transfer capacity of the interconnection during steady state and transient conditions, and recommend methods of increasing the transfer limits and stability margins of the interconnected system. Voltage regulating equipment such as capacitor banks, SVCs, Power system stabilizers, or an increase in the voltage level of the line could be employed;
- Assess the technical and financial impact of a change in line voltage level and recommended the optimal voltage level to ensure a maximum power transfer
- Perform static, dynamic and transient stability studies at 5-yr intervals, to establish among others, the levels of inter-area oscillations in the interconnected system and propose possible remedies. The simulation software that would be used should be compatible with PSS/E
- The scenarios for generation, transmission and financial analyses should be developed by the Consultants and approved before execution. Sensitivity analysesSensitives analysis should be considered to capture the impact of variation of key data (demand, generation, etc)
- Calculate system losses for different transit alternatives;

- Analyse the effect that the different alternatives shall have on the steady state performance and transient and dynamic stability of the interconnected system;
- Calculate fault levels in the interconnected systems and recommend measures to ensure that fault levels do not exceed the breaking capacity of protection equipment already installed and do not propagate into individual or other systems.
- Perform system security analysis to establish strategies for maintaining acceptable operating conditions during normal operation and to secure the system during disturbances. Concepts such as Frequency Control Reserve (FCR), Momentary Disturbance Reserve (MDR), Automatic Frequency Load Shedding (AFLS) and Manual Activated Load Shedding (MALS), Special Protection Schemes (SPS), etc could be employed.
- Perform switching studies to determine receiving-end voltages and propose the necessary compensation for maintaining the voltages within acceptable limits.
- Catalogue for each country and on an annual basis, how the energy and power requirements are being met over the planning horizon.
- Identify the network reinforcements required at the national level (transmission and sub-transmission) to improve power exchanges/delivery through the project.

In order to ensure consistency in the models to be developed by the Consultant in conducting the system analyses, the Consultant shall ensure that the network analyses are conducted in conjunction with experts from each of the utilities. In developing the network model within the framework of this project, the Consultant shall consult the latest model on the WAPP interconnected system. In this regard, the Consultant shall invite to his Home Office, one (1) expert knowledgeable in network analyses from each utility and WAPP Secretariat to review and discuss the developed model and the preliminary results of the network analyses. The proposal of the Consultant shall assume that this exercise shall not be less than one (1) week.

Also, in order to allow the stakeholders to make their decision regarding the level of voltage to be adopted for the line, the Consultant shall produce an interim report on the assessment of voltage level of the line which will specify among others, the technical and financial impact and the recommendation of the Consultant taking into account the standard levels of the countries concerned by the project. This report shall be presented at the data report validation meeting and will allow the Consultant to base the rest of the study on the level of voltage that will be adopted.

As part of the system analyses, the Consultant shall conduct detailed analyses on transmission losses to determine increases in losses in the three beneficiary countries solely attributable to the exports of power from Ghana through Burkina to Mali.

The Consultant shall in particular, assess the possibility of loop flows between Ghana and Cote d'Ivoire and propose possible solutions to address the situation if such is the case.

*The Consultant is reminded that the Ghana-Burkina-Mali Interconnection Project is designed to interconnect the Bolgatanga Substation in Ghana to the Sanankoroba Substation in Mali via Bobo Dioulasso in Burkina Faso and Sikasso in Mali. The section from Sanankoroba to Sikasso is currently under construction. The Consultant shall also assess, taking into account the commissioning horizon of the Bolgatanga-Bobo-Sikasso section and the expected power flows, the need to extend the Ghana-Burkina-Mali line from Sikasso to Sanankoroba via Koumantou and Bougouni in order to reinforce the 225 kV Sanankoroba-Sikasso line currently under construction. To this end, the Consultant shall carry out a cost-benefit analysis of the extension by evaluating, in*



*particular, its cost, impacts on transfer capacity, network stability and transmission losses, and make recommendations for the implementation of this reinforcement within the framework of the East-West transversal backbone included in the ECOWAS Master Plan which should interconnect Sikasso to Dakar via Fomi.*

#### ***4.5.2. Preliminary Engineering and Preparation of Specifications for Equipment and Works***

The services of the Consultant in this study shall include all preliminary engineering investigation which shall define the functional technical specifications of the envisaged equipment and works for the complete integration of the interconnection line into the existing systems, the required associated substations, and the SCADA and required communications systems suitable for preparing Design, Supply and Installation Bidding documents with Pre-qualification if necessary. In proposing a preliminary design and associated functional specifications, the Consultant shall consider alternatives and provide justification for the design based on techno-economic and cost-benefit analyses, in particular :

- For the line: towers, conductors (section, type and bundle configurations), insulators (type) and earthwire.
- For the substations: configuration and arrangement (busbar, feeder, etc) , power transformer, MV switchgear, etc

The preliminary design and the alternatives shall also take into account the preliminary results of the ESIA. The Consultant shall also integrate the requirements of the WAPP Information and Coordination Center. The Consultant shall furthermore consider the operation and maintenance requirements of GRIDCo, SONABEL and EDM-SA in the development of the preliminary design and functional technical specifications and shall evaluate the consequences of the design on the systems of GRIDCo, SONABEL and EDM-SA.

The preliminary engineering investigation shall also enable the selection of design criteria and result in a preliminary design for the Ghana – Burkina – Mali Interconnection Project that shall ensure the complete and seamless integration of the Project into the WAPP Interconnected System as well as the national power systems, including the Dispatch and/or Control Centers. In effect, the scope of work of the Consultant shall include all the necessary work (including the preparation of the Bidding Documents) that ensures that each concerned national dispatch/control center (as well as the WAPP Information and Coordination Center if required) can “see” and manage its component of the Ghana – Burkina – Mali Interconnection Project.

The Consultant shall identify the basic issues that shall be addressed in the study in order to ensure that the interconnection project is economically efficient (minimum total life cycle cost while meeting certain minimum standards) and that all individual sub-projects have consistent technical standards. The Consultant shall then analyze the issues related to the interconnection project, and shall establish functional specifications and design criteria for the interconnection project. The basic design studies shall be related to conceptual (primary voltage level), electrical (equipment, substation sizing, conductors, protection system), civil (tower structures, hardware, insulators, type of foundation), quality of service (voltage, frequency, reliability, phase imbalance, harmonic distortion, stability) and SCADA (communications, tele-protection schemes).

Based on the data review exercise, the preliminary engineering investigations and concept drawings (line routing, single line diagrams, lay out, ancillary services, protection and relay configuration, etc) and any other relevant basis, the Consultant shall then propose (i) a preliminary design for the Ghana – Burkina – Mali Interconnection Project and the required network reinforcement (ii) the functional specifications and (iii) detailed cost estimation.. The design shall ensure the effective integration of the project into the entire existing systems, including the national dispatch centers (as well as the WAPP Information and Coordination Center if required), and takes into consideration all relevant issues that include but not limited to:

#### ***4.5.2.1. Interconnection Line***

a) Technical Conditions that include but not limited to:

- Engineering Conditions taking into consideration relevant international, national and the utility's own standards.
- Ambient Conditions taking into consideration maximum and minimum air temperatures, humidity, keraunic levels, thermal resistivity and quality of soil, pollution level, wind speed etc
- System Conditions taking into consideration frequencies of systems and their compatibility, short circuit levels, grounding systems, communications systems including fibre optic (OPGW) and SCADA systems and their compatibility etc.

b) Technical Requirements that include but not limited to:

- Transmission capacity (optimization of the section, type of conductor and bundle) at given conditions taking into consideration voltage control, reactive power production;
- Design of double circuit transmission line
- Synchronizing capacity taking into consideration voltage control, reactive losses,
- System Reliability taking into consideration various fault scenarios, contingencies, lightning protection, insulation co-ordination, stability, load flow,
- Dependability taking into consideration availability, maintainability, adequacy of structures and conductors,
- Loss Optimization taking into consideration no-load, load, reactive,
- Environmental and social aspects taking into consideration aspects studied in the ESIA potentially including but not limited to electrical noise, visual impacts, acoustic noise, electric and magnetic field influence, use of land / right-of-ways, etc;
- Electrification of communities/villages along the line route possibly through shield-wire or other technology;
- Public and Personnel safety issues taking into consideration protection, safety of construction and operation
- WAPP Operations Manual.

In proposing a design, the Consultant shall also integrate, where appropriate and relevant, the guidance given in <sup>1</sup>Cigre's "Guide to Overall Line Design – Working Group B2.51, December 2015" annexed to this ToR and in CEI/IEC 60826-10 (December 2010). The Consultant shall also propose a detailed list of recommended spare parts that shall be included in the bidding documents.

#### ***4.5.2.2.Substations***

For the required associated substations, the Consultant shall have to first of all determine, in consultation with the concerned utilities and in consideration of the update on the Line Route and ESIA Study, whether new substations shall have to be created or whether existing substations shall have to be extended. In case of the extension of substations, the Consultant shall have to study, estimate and examine the extensions to be done and the configuration of the existing substations to appropriately position the arrival of the transmission lines. The evaluation shall have to take into account among others:

- The available space for the protection and control equipment, energy meters, telecommunication panels and electrical auxiliary fittings, etc.;
- The available space in the cable trenches;
- The capacity of the existing equipment to support an increase of the load of the substation and higher fault current;
- The capacity of the ground Grid of the substation to support higher ground fault current.

The Consultant shall also take into consideration among others:

a. Technical Conditions that include but not limited to:

- Engineering Conditions taking into consideration relevant international, national and the utility's own standards.
- Ambient Conditions taking into consideration maximum and minimum air temperatures, humidity, keraunic levels, thermal resistivity and quality of soil, pollution level, wind speed, existing environmental and social liabilities in the existing substations, e.g. oil pollution, etc.
- System Conditions taking into consideration frequencies of systems and their compatibility, short circuit levels, grounding systems, communications systems including fibre optic and SCADA systems and their compatibility etc.

b. Technical Requirements that include but not limited to:

- Transmission capacity at given conditions taking into consideration voltage control, reactive power production;
- Synchronizing capacity taking into consideration voltage control, reactive losses,

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<sup>1</sup> Conseil international des grands réseaux électriques, International Council on Large Electric Systems

- System Reliability taking into consideration various fault scenarios, contingencies, lightning protection, insulation co-ordination, stability, load flow,
- Dependability taking into consideration availability, maintainability,
- Loss optimization taking into consideration no-load, load, reactive,
- Environmental and social aspects taking into consideration aspects studied in the ESIA potentially including but not limited to electrical noise, visual impact, acoustic noise, electric and magnetic field influence, use of land / right-of-ways; etc.
- Electrification of communities/villages along the line route possibly through shield-wire or other technology;
- Public mainly local communities and Personnel safety issues taking into consideration protection, safety of construction and operation
- WAPP Operations Manual.

The Consultant shall also propose a detailed list of recommended spare parts that shall be included in the bidding documents.

#### ***4.5.2.3. Communication and SCADA Systems***

Communication including tele-protection schemes and supervisory control and data acquisition systems (SCADA) exist in the networks. The Consultant shall review the existing systems and if found adequate, propose the extension of these systems to cover the new works. If found inadequate, the Consultant shall make an appropriate proposal that shall include the reinforcement/upgrade of the existing systems in consultation with the concerned utilities. In any case, the Consultant shall ensure full and seamless connectivity between the proposed infrastructure/project and the existing national Dispatch Centers. All proposed extensions shall be digital systems. The Consultant shall also take into consideration the ongoing development of the WAPP Information and Coordination Center, the stipulations in the WAPP Operations Manual and ensure compatibility with the systems proposed.

The Consultant shall ensure that the project integrates seamlessly into the existing interconnected system and that the proposed communication and SCADA systems are compatible with the existing systems as well as guarantee effective communication between the two systems. The use of Fibre Optical Transmission System (FOTS) based on Optical Ground Wire (OPGW) on the high voltage line should be considered as the primary communication channel. PLC shall then be used as backup for the FOTS.

#### ***4.5.2.4. Electrification of Communities/Towns/Villages along line route and around substations***

As a Social Mitigation Measure and to increase acceptability of the project by the populations in the vicinity of the project, it is envisaged that all communities/towns/villages which are located five (5) kilometers on each side of the transmission lines and having populations between 500 and 2,500 inhabitants could become Beneficiaries of an electrification scheme. This electrification could be done through conventional means (medium voltage outlets from the

Substations to be constructed under the project), extensions from nearby distribution systems, and/or shield-wire technology (SWS).

On the basis of a list of communities to be established by the Consultant preparing the Line Route and Environmental and Social Impact Assessment Study and Resettlement Action Plan in conjunction with the involved national power utilities, the Consultant shall, in close collaboration with the concerned utilities, make a detailed and justified proposal for achieving the electrification of the identified communities.

In this respect, the scope of services to be provided by the Consultant shall include but not be limited to:

- Data collection and review and description of the methodology to prepare this part of the assignment;
- Justified recommendation on technology mode of electrification of each community/town/village;
- Proposal on least cost solution to achieve electrification including cost estimate, plan and profile.

#### *Data collection and review and description of the methodology*

Following the kick off meeting, the Consultant shall immediately proceed with the data collection exercise. The Consultant shall gather, review and compile all relevant technical, institutional, economic and cost data on the Ghana, Burkina-Faso and Mali distribution and rural networks necessary for the conduct of the study. The Consultant shall review all existing available reports/studies that could contribute in preparing this part of the Assignment. As part of the data collection, the Consultant shall investigate whether some of the communities/towns/villages that are on the agreed list are subject of other ongoing electrification schemes being implemented by the involved countries. In the case where the required data is not available, the Consultant shall use his best judgement based on acceptable international practice to provide substitute data. The Consultant shall however provide a justification for the choice of data in the Data Report. All the information collected by the Consultant shall be submitted as part of the submissions on the Data Collection Report but as a separate Volume. The Consultant shall also describe in this separate Volume, the envisaged methodology for conducting this part of the Assignment if different from the one presented during the kick off meeting. The amended methodology shall be validated during the meeting to review the draft Data Report

#### *Justified Recommendation on technology mode of electrification of each community/town/village*

On the basis of the list of communities/towns/villages, the Consultant shall:

- Determine the approximate energy demand, over the period of the study, of each community/town/village based on the population and public infrastructure that include but not be limited to Government/local administration offices, education and health facilities, as well as water supply installations.
- Determine the most optimal technology solution for providing electricity to each community/town/village through conventional means (medium voltage outlets from the Substations to be constructed under the project), extensions from nearby

distribution systems, and/or shield-wire technology (SWS). The Consultant shall also investigate whether some of the communities/towns/villages that are on the agreed list are subject of other ongoing electrification schemes being implemented by the involved countries. In determining the optimal solution, the Consultant shall highlight the advantages and disadvantages of each of the afore-mentioned schemes including SWER and MALT technology. The Consultant shall also do a cost/benefit analysis of each of the afore-mentioned schemes and make a justified recommendation. The cost for each scheme should be life-cycle, and shall cover among others cost estimations for the infrastructure (medium voltage, low voltage, customer service connections, street lighting), environmental and social impact, as well as operation and maintenance.

- Make a recommendation, based on the outcomes of the above-indicated analyses, as to the least cost optimal solution for achieving the electrification of the communities/towns/villages.

The outcomes of this work, including the recommendation of the Consultant, shall be submitted as part of the Preliminary Feasibility Report but in a separate Volume.

*Proposal on least cost optimal solution for achieving electrification of each community/town/village*

Upon adoption of the Recommendation by the stakeholders during the seminar to examine the Preliminary Feasibility Study Report, the Consultant shall prepare a Proposal for achieving the electrification of the communities/towns/villages. In this regard, the Consultant shall:

- Describe in detail the least cost optimal solution;
- Identify jointly with the preparation of the Line Route and ESIA Study for the Ghana-Burkina-Mali Interconnection Project, provisional line routes for the medium voltage networks as well as locations for the required medium voltage substations. The identification of the provisional line routes shall be in conformity with the requirements stipulated in the relevant part of the Terms of Reference of Line Route and ESIA and RAP Study;
- Prepare preliminary designs, specifications and indicative bills of quantities for the medium and low voltage systems as well as customer service connections and street lighting that shall be needed for the complete electrification of the communities/towns/villages in line with the requirements of the concerned utilities. For SWS technology, the Consultant shall specify the requirements on the Transmission lines (tower outlines, earth-wire and OPGW, insulator) and the required equipment in the substations;
- Prepare all the necessary layout drawings and maps for each community, showing in sufficient detail, the proposed medium voltage and low voltage systems that shall be required to achieve the electrification from the Transmission Line and/or substation;
- Prepare cost estimates for the retained electrification scheme, broken down per country and including supervision cost for project procurement and implementation as well as the costs associated with the environmental and social impacts. The Consultant shall note that the cost of the electrification scheme shall be part of the global project cost but as a separate item;

- Highlight the socio-economic benefits of implementing the electrification of the identified communities/towns/villages, including an indication of the economic viability and the social and poverty alleviation impact of the electrification scheme.

The outcomes of this work shall be submitted as part of the Revised Preliminary Feasibility Study Report but as a separate Volume.

#### ***4.5.2.5. Geotechnical Studies***

Optimal sites and routes for substations and transmission line will be chosen according to the soil conditions. Number of boreholes and their depth shall be defined to ensure sufficient soil investigations. A drilling rig for substations, a drilling rig or a heavy shock penetrometer (with possibility of sampling for soil identification) for lines shall be used.

##### For Transmission Lines

After final route selection, the Consultant shall undertake geotechnical studies. Before starting investigations on site, he shall plan his works using the geomorphological photo-interpretation he will have to do on a 200 m corridor (100 m each side of the final route). This photo-interpretation shall show the limits of each type of soils, including rock as well as the geotechnical risk areas.

The main objective of these investigations is the assessment of the bearing capacity on the sites of the main towers: angle, large river-crossing or towers in geotechnical risk areas, such as wet lands or deep soft surficial deposits. These investigations shall also measure the average soils resistivity along the line route.

All this will require sites visits to ensure there is enough data available to assess the feasibility of the works and to limit further modifications by EPC Contractors with regards to the soil conditions.

The borehole investigation shall be done at all heavy angle towers (more than 30°), at large river-crossings and at least every 10 km giving priority for risk areas and light angles towers.

The Consultant shall prioritize the use of a heavy dynamic penetrometer that can collect samples for soils identification. The Consultant may use instead a drilling rig in case of difficult soil conditions such as thick layers of soft and compressible soils.

The investigations depth shall be at least, if solid rock is not encountered, 8 m under tangent towers or 12 m under angles towers. Bearing capacity shall be determined at typical foundations depth.

##### For Substations

The Consultant shall undertake geotechnical studies on final substations locations (if information is not available).

One of the main goal of these investigations is to ensure that all the structures and apparatus for substations will have their foundations on stable soil non inundated with sufficient bearing capacity. These investigations shall also measure the soils resistivity above the substations. All this will require sites visits to ensure there is enough data available to assess the feasibility of the works and to limit further modifications by EPC Contractors with regards to the soil conditions.

For substations, a minimum of 2 borings holes with a drilling rig will be required together with a minimum of 2 geophysics profiles. For every site general geologic context and construction constraints shall be identified.

For the boring holes on substation sites, it is important:

- To distinguish consolidated soils from bed rock by penetrating at least 3m in bedrock
- To fully go through layers of soft and compressible soils
- To collect soil samples every 1,5 m and in all different layers
- To collect undisturbed samples in clay and to make SPT tests in granular soils

For Lines and Substations:

The geotechnical studies report shall contain the following information:

- Dynamic Penetrometer type
- Photos at each investigation site
- Geodesics coordinates of each investigation site
- Site exploration description: boring depths, soil types encountered
- Laboratory tests reports and soils classification according to ASTM standards
- Gross results profiles for each site
- Results interpretations and bearing capacity determination according to typical foundation data for each site
- Rock depth if reached
- Groundwater level if reached
- Geotechnical recommendations: foundations bearing capacities, design criteria for superficial and deep foundations, site preparation, excavation specifications
- Sites seismic parameters, soil movement and liquefaction

#### ***4.5.2.6. Preparation of Drawings, Bill Of Quantities and Technical Data Sheets***

The Consultant shall prepare all drawings related to the preliminary engineering of the project including network reinforcements as well as the component related to the electrification of communities along the line route. All costs associated with the procurement and preparation of the maps and drawings shall be deemed to be included in the Financial Proposal of the Consultant.

The consultatnt shall also prepare all the Bill of Quantities for the different components and the Technical Data Sheets of the various equipment that will be integrated in the Bidding Documents.



#### **4.5.3. Project Implementation Schedule**

The Consultant shall prepare an indicative Project Implementation Schedule highlighting all key milestones to be achieved and that clearly indicates the commissioning date of the project. In preparing the Schedule, the Consultant shall highlight the impacts of any identified network reinforcements on the implementation of the project.

#### **4.5.4. Economic and Financial Analyses**

The Objective of the present study is to determine the financial and economic viability of the Interconnection Project, its developmental impact, and provide relevant and sufficient justification for the realization of the project.

The Consultant shall prepare detailed cost estimates of the Interconnection Project, broken down into countries that include the costs associated with the outcomes of ESIA and RAP Study, project management monitoring and evaluation and if necessary, the required national reinforcements. The cost estimates must include any generation investment required by Ghana if any to ensure they are able to export electricity at expected marginal cost.

The Consultant shall evaluate and compare the costs and benefits<sup>2</sup> of the project against alternative scenarios Alternative line routings, and/or alternative scenarios for power supply so as to determine the economic and financial profitability of the project per country and the region, as well as the rationale for public financing of the project. The benefits resulting from the interconnection project shall be measured using the "with and without" concept with detailed explanation of the analyses and assumptions made especially with regards to "avoided costs". In particular, net benefits shall be calculated by comparing total system costs and benefits of the "with project" scenario with those of the "without project" scenario, with the counterfactual assumptions clearly shown. Un-quantifiable benefits shall be discussed qualitatively. Costs associated with the least cost plan shall be adjusted as necessary with due regard to alterations necessary to the individual plans. Among other indices to be calculated, the Consultant shall compute the Economic Net Present Value (ENPV), Financial Net Present Value (FNPV), Financial Internal Rate of Return (FIRR) and Economic Internal Rate of Return (EIRR) of the project, conduct sensitivity analyses and explain in detail the results. For the project economic viability and in consideration of hurdle rates (and by determining switching values), sensitivity analyses shall be conducted on among others, transit on the interconnector, capital cost, fuel cost (Gas, Diesel), and Commercial Operation Date. Similarly, for the project financial viability and by determining switching values, sensitivity analyses shall be conducted on among others, Capex, O&M, Tariff, Load Factor, Losses and revenue collection rate.

The Consultant shall also highlight the developmental impact of the project for the countries concerned as well as the ECOWAS region. In this regard, the Consultant shall conduct distributional analyses in order to determine among others, the distribution of Cost and Benefits among Stakeholders.

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<sup>2</sup> The economic analysis shall be consistent with the following guidelines of the World Bank: i) Operational Policy and Bank Procedure 10.00, Investment Project Financing, ii) Power Sector Policy and Investment Projects: Guidelines for Economic Analysis, iii) Social Value of Carbon in Project Appraisal 2014 and (iv) Discounting Costs and Benefits in Economic Analysis of World Bank Projects 2016.

The Consultant, in consultation with the WAPP Secretariat, concerned countries and Funding Agencies that shall be involved in the project, shall prepare an elaborate Financing Plan for the project. The Financial analysis should take into consideration the Financing Plan as well as the WAPP Transmission Tariff Methodology, and propose a Levelized Transmission Cost (LTC) that shall make the project financially viable and guarantee a return on investment that would be acceptable for the project to be completed. The proposal on the LTC shall take into consideration the relevant requirements of the ECOWAS Regional Electricity Regulatory Authority (ERERA), in particular, the WAPP Transmission Tariff Methodology. In addition, the Economic and Financial analyses including a LTC Proposal and sensitivity analyses shall be done taking into consideration among others, load forecasts, generation costs, generation and transmission expansion plans, capital costs, the envisaged mode of operation, project implementation delays, and economic parameters. The analyses, which shall include the development of appropriate models, shall affirm the economic and financial viability of the Interconnection Project.

The Consultant shall prepare a detailed manual of use for the financial model to be developed by the Consultant in establishing the financial viability of the project. The Consultant shall provide detailed explanations on the functioning of the model and the manual during the training in the Consultant's Home Office and also effectively transfer these with full functionality and capable of being completely edited/modified. The Consultant shall note that the model shall only be considered as final upon examination and adoption by the national utilities and Funding Agencies that shall be involved in the project. As part of the approval process, the Consultant may be required to make amendments to the model to incorporate comments and reactions from the national utilities and the Funding Agencies.

The Consultant shall also assess the applicability of Carbon-financing and Clean Development Mechanisms to the project and shall make a detailed proposal in this respect with a view to expanding funding possibilities for the project. In this regard, the Consultant shall compute and value the Greenhouse Gas emissions of the project in conformity with the World Bank's Guidance on the Social Value of Carbon as well as the Guidance on the Greenhouse Gas Accounting for Energy Investment Operations.

#### **4.6. Risk Analyses**

The Consultant, through Monte Carlo simulation or similar method, shall identify and evaluate threats to the project and shall recommend appropriate measures to forestall degradation or justify the primary objectives of the project with regard to deadlines, costs and technical specifications during the implementation stage and performance during the operational phase.

This analysis shall include the following:

- Identifying potential risks and categorising such risks according to their:
  - relation to the project: internal or external;
  - nature: political, environmental, social, resettlement, economic, institutional, legal, technical, organisational, financial risks, etc;
  - origin: Sub-Contractors, Public Authorities, Donors, Consumers, etc;

- impact: cost overruns, non-compliance with deadlines and technical specifications, delays in Commercial Operation Date, counter-productive operations, foreseen revenue collection.
- Quantitative risk analysis with a view to evaluating the direct and indirect impacts on the objectives of the project and the probabilities of their occurrences. This assessment may be completed with a qualitative analysis;
- Proposing measures for preventing risks and reducing their impacts, any eventual emergency plan scenarios, a definition of the duties and responsibilities for risk management.

The Consultant shall propose an appropriate implementation strategy for the project that mitigates against the risks identified and provides contingency scenarios that would allow for the complete execution of the project.

## **4.7. Training Programme**

### ***4.7.1. Environmental, Social, Health and Safety aspects***

Training of staff of GRIDCo, SONABEL and EDM-SA as well as the institutions in charge of environmental and social protection in the concerned countries shall be required. The training, which shall be conducted in each country, shall cover the issues as outlined in the Provisional ESIA Report and RAP which could include but not limited to the following:

- Management and monitoring of health, safety, environmental and social issues
- Management of the right-of-way acquisition process
- Management of the right-of-way during the maintenance phase of the project
- Environmental and Social impact mitigations

The training shall also be opportunity for the Consultant to validate with each stakeholder, the capacity building requirements for implementing the outcomes of the ESIA and RAP Report in the respective countries in line with the adopted institutional framework for the project.

The Consultant shall design and propose the training program, which should be approximately costed. The proposal shall therefore also include costs associated with the full transfer of hardware and software to the WAPP Secretariat and each of the utilities, of the different software used within the framework of the Line Route and Environmental and Social Impact Assessment Study and Resettlement Action Plan (RAP). The training shall be done in a workshop to be organized by the Consultant in each of the countries after submission of the draft reports under the ESIA and RAP. The Consultant shall provide this training for 20 experts in each country for a period not less than 1 week including all stakeholders that shall be involved in the implementation of the outcomes of the ESIA and RAP Reports. The outcome of discussions at this training workshop would be an input to finalize the ESIA and RAP Reports. At the conclusion of the training, the Consultant shall submit a comprehensive Report on the training conducted, as part of the Monthly Report for the month in which the training was conducted. The consultant shall provide a comprehensive capacity build program regarding other E&S risks management

trainings or sensitizations such as provisions for taking into account the social inclusion, vulnerable groups, complaints management, SEA/SH, child and forced labor, etc.

The costs of the participation of the stakeholders shall be supported by the Client.

#### ***4.7.2. Technical aspects***

Training is envisaged as part of the services to be provided by the Consultant in both English and French. To this end, each utility shall provide two (2) counterpart staff and the WAPP Secretariat shall provide two (2) staff.

The training shall be done through transfer of know-how on the ground and in the home office of the Consultant. In each of the three (3) countries, the Consultant shall integrate the two (2) counterpart staff provided by each utility into his team and shall work closely with them during the different phases of the Project.

The training in the offices of the Consultant shall also include one (1) participant from the Ministry in charge of Energy in each country in addition to the two (2) counterpart staff provided by each utility and three (3) participants from the WAPP Secretariat. The training in the offices of the Consultant shall be conducted after receipt of the preliminary Feasibility Study Report by the WAPP Secretariat and the concerned Utilities.

The costs of the participation of the stakeholders shall be supported by the Client.

The Consultant's proposals shall include the details of the Training Program. The training in the offices of the Consultant, shall not be less than two (2) weeks. The proposal of the Consultant shall also show the approach and methodology that shall be employed to achieve effective transfer of knowledge to the counterpart staff. The Training Program shall include, but not limited to:

- Model and methodology employed in the performance of the economic and financial analyses and software used. The analyses conducted on the Project shall be comprehensively demonstrated during the training program
- Model and methodology employed in the technical analysis of the interconnection and software used. The analyses conducted on the Project shall be comprehensively demonstrated during the training program
- Selection of the design criteria, design of the interconnection line and substations including equipment selection and specifications as well as software used
- Site Visits

The proposal shall therefore also include costs associated with the full transfer of hardware and software to the WAPP Secretariat and each of the utilities and Ministries in charge of energy of the different software including models used within the framework of the technical, economic and financial studies to ensure their maximum benefit. At the conclusion of the training the Consultant shall submit a comprehensive report on the training conducted as part of the Monthly Report for the month in which the training was conducted.

#### **4.8. Project packaging and preparation of Pre-qualification and functional Bidding Documents**

The Consultant shall prepare and present an indicative financing plan and a project packaging to meetings of Partners that shall be organized by the WAPP Secretariat to mobilize financing for the implementation of the project. Following the adoption of the financing plan and packaging, the Consultant shall prepare functional bidding documents in line with the procurement guidelines and standard bidding documents of the Funding Agency(ies) that shall be involved in the project, including Pre-Qualification documents if necessary. The preparation of the Bidding Documents shall be done in line with the approved Financing Plan for the project. The draft and final Bidding Documents shall be delivered in a form and formatting acceptable to the Client and the Funding Agency(ies) involved in the project. The Bidding documents shall be adequate for “EPC” procurement and shall include among others well-defined functional specifications (General and Particular). The Bidding documents shall also be suitable for separate procurement of the project by each country involved if necessary. Subject to conformity with the requirements of the Funding Agencies that shall be involved in the project, the Bidding Documents shall contain, but not limited to the following:

- Invitation for Bids
- Instructions to Bidders
- General Conditions of Contract
- Special Conditions of Contract
- Indicative Bill of Quantities
- Technical Data Sheets
- Technical Functional Specifications (General and Particular)
- Drawings of format that conforms to the requirements of the Funding Agency(ies), utilities and permits performance-based procurement.
- Implementation Schedule
- General Organizational Specifications and Safety, Health, Social and Environmental requirements.

The Consultant shall propose an adequate packaging of the Project that shall be broken down per country if necessary and shall be in line with the requirements of the Funding Agencies involved in the project. Detailed designs and drawings shall be prepared by the Contractor under “EPC contract” procurement for the plant and equipment. The Consultant shall specify the detailed drawings to be submitted by prospective Contractors.

##### ***4.8.1. Transmission Lines***

For Transmission Lines, the Design Specifications shall be, without being limited to:

- Overhead Lines Design criteria
- Tower design
- Foundation design
- Choice and design of conductors, earth-wires (with and without optical fibers)
- Choice and design of Insulators and Insulators strings
- Choice and design of span and assembly hardware
- Detailed Project Description

For Transmission Lines, the Manufacturing and Installation Specifications shall be, without being limited to:

- Detailed Scope of Works
- Packing, marking, transportation, handling and storage
- Manufacturing and Construction Quality Assurance and Quality Control
- Towers Manufacturing
- Conductors and cables manufacturing
- Insulators and Insulators strings manufacturing
- Span and assembly hardware manufacturing
- Right of way clearing, access roads and temporary facilities
- Foundations Construction
- Towers Assembly and Erection
- Conductors installation
- Earth wires installation
- OPGW (OPTical Ground Wire) installation
- Insulators strings, span and assembly accessories installation

#### **4.8.2. Substations**

For the Substations, the Design, Manufacturing and Installation Specifications shall be, without being limited to:

##### **Substation Design**

Substation design work shall include mainly the following activities:

- Establish the scope of work of modifications and addition of equipment for the extensions/expansions and/or new substations to be built;
- Establish the substation design criteria (supply and installation) for major equipment, protection, control, metering, communications (teleprotection and SCADA) and civil works in accordance with the current state-of-the-art technology and the latest international standards;
- Study and establish the optimal solution for the extension/expansion of substations taking into account cost and high degree of performance for equipment layout, protection, control and metering, both for the new line terminations and new substation;
- Review the suitability of existing equipment for the extension/expansion of the substations; and
- Revision of existing drawings due to modifications made under the present scope of works and production of new drawings.

As part of the substation design work, the Consultant shall prepare new drawings to a sufficient level of detail to allow a contractor to understand the scope of work and to determine the requirements for the new line termination equipment, substation equipment, protection, control and metering, and station auxiliary systems.

The affected drawings will include:

- Single line diagrams that will indicate the station arrangement, the characteristics of primary equipment including power transformers and switchgear, current and voltage transformers required for protection and metering, equipment for teleprotection, etc.;
- Layout drawings that will include sections and elevations showing, in general, the equipment layout and station arrangement according to the single line diagram. Layout drawings will also show the revision/addition of cable trenches in the substations;
- Conceptual design of the protection and communication system mainly for power transformer, busbar and transmission line;
- Protection and metering single line diagrams that will show the zones of protection and type of protection such as line protection, busbar protection, transformer protection and teleprotection;
- Protection, control and communication logic diagrams that will specify the protection and control philosophies and communications requirements;
- Panel layout in the control rooms that will show the panel arrangement and room extensions if required; and
- AC and DC auxiliary single line diagrams and panel schedules that will specify the DC and AC supply for the new equipment. Adequacy of existing DC system will be checked.

### **Substations Technical Specifications**

The technical specifications for the substations shall be performance specifications and shall define the requirements for supply and construction of the extension/modifications of the existing and/or new substations. All required specification drawings for equipment, and system specification installation, testing and commissioning shall be prepared.

The specifications shall cover, but not be limited to the following items:

- Substations construction, expansion and/or modifications including the busbar arrangement and switching configurations, major equipment, basic control, protection and metering requirements and auxiliary supplies;
- Station general arrangements (layout, sections and details);
- Protection and control logic and interlocking requirements;
- Control and protection equipment, material and hardware specifications including permissible types of control hardware, cabling and termination indication and recording instruments;
- Telecommunications and SCADA;
- Electrical and mechanical auxiliary systems;
- Civil and architectural works (site surveys, switchyard and building foundation, bus and equipment support structures, cable trenches, ducts and other underground services, etc.);
- Technical data sheets: schedule of guaranteed characteristics and requested or required data and bidders data;
- General manufacturing, inspection, packing and transportation specifications;

- Construction specifications of all electrical, electro-mechanical, civil, structural and architectural works.

The technical specifications shall fully define interfaces of the new installations with the existing installations.

The technical specifications shall permit to the extent possible, without jeopardizing the reliability of the system and its operation and maintenance, the widest international competition for the supply of new equipment and systems.

The specification drawings shall comprise the revision of existing drawings and the preparation of new drawings that shall be the result of the final design.

The following drawings shall be provided with the technical specifications:

- Single line diagram;
- Switchyard layout (plan view, sections and details);
- Control building layout (control room, etc.);
- Protection and metering single-line diagram;
- Protection, control and communication logic diagram;
- Communication block diagram;
- AC and DC single-line diagrams and panel schedules;
- Grounding layout; and
- Civil, structural and architectural drawings (equipment, foundations, etc.).

Price schedule for all materials and all major components shall be prepared, such as:

- Buswork;
- Transformers;
- Circuit breakers;
- Disconnect switches;
- Voltage transformers;
- Current transformers;
- Protection, control and metering equipment;
- Communication system;
- SCADA;
- Cabling; and
- Civil works.

#### **4.9. Terms of Reference of Owner's Engineer**



The Consultant shall prepare the Terms of Reference for recruiting an Owner's Engineer responsible for the followings:

- Revision of the Bidding Documents before launching the call for tenders (if required);
- Assistance to the Client in the selection of the Contractors;
- Supervision of the works during the implementation of the Project.
- Update / finalise ESIA and ESMP report according to the final designs prepared by the Contractors

## 5. DURATION OF STUDY AND SCHEDULE

The duration for executing the Services shall not exceed 82 weeks. The Consultant shall propose in their offer, a detailed implementation schedule for the consultancy.

In this regard, the following indicative schedule is proposed:

#	Activities	Milestones
1	Date of Commencement of Services / Kick-off ( <b>Meeting</b> )	Wo
2	Submission of Inception Report	Wo + 4 weeks
3	Submission of Draft Data Report and Line Voltage assessment	Wo + 8 weeks
4	Submission of Comments on Draft Data Report and Line Voltage assessment ( <b>Meeting</b> )	Wo + 10 weeks
5	Submission of Draft Scoping Report and Stakeholder Engagement Plan	Wo + 12 weeks
6	Submission of Final Data Report	Wo + 12 weeks
7	Submission of Comments on Draft Scoping Report and Stakeholder Engagement Plan ( <b>B to B Meetings</b> )	Wo + 14 weeks
8	Submission of Final Scoping Report and Stakeholder Engagement Plan	Wo + 16 weeks
9	Approval of Final Scoping Report by Permitting Authorities in Ghana	Wo + 20 weeks
10	Submission of Draft updated provisional Line Route Report	Wo + 22 weeks
11	Field trip to assess proposed updated Provisional Line Route	Wo + 24 weeks
12	Submission of Comments on Draft updated provisional Line Route Report ( <b>Meeting</b> )	Wo + 25 weeks
13	Submission of Final Report on the updated Provisional Line Route + List of Potential Communities along Line Route to be electrified	Wo + 27 weeks
14	Transmission by WAPP to Countries on List of Potential Communities along Line Route to be electrified	Wo + 28 weeks
15	Confirmation by Countries on List of Potential Communities along Line Route to be electrified ( <b>Meeting B to B</b> )	Wo + 30 weeks
16	Submission of Preliminary Feasibility Study Report with Proposal on Electrification of Communities and justified Recommendation on technology mode of electrification of each community/town/village	Wo + 34 weeks
17	Submission of Draft Report ESIA and RAP for Ghana, Burkina and Mali	Wo + 34 weeks
18	Training Session and Pre-validation in Consultant's Home Office commences on Feasibility Study	Wo + 36 weeks
19	Training Session in Consultant's Home Office concludes on Feasibility Study	Wo + 38 weeks
20	Submission of comments on Recommendation on technology mode of electrification of each community/town/village ( <b>B to B Meetings</b> )	Wo + 39 weeks
21	Submission of Revised Preliminary Feasibility Study Report with Recommendation on technology mode of electrification of each community/town/village	Wo + 40 weeks

22	Submission of Proposal on Electrification of Communities (proposal lists of eligibles towns/villages to be electrified will be needed)	Wo + 42 weeks
23	<u>Submission of Draft Report ESIA and RAP for communities to be electrified in Ghana, Burkina and Mali</u>	Wo + 48 weeks
24	Training program in Ghana on ESIA and RAP Study ( <b>In country</b> )	Wo + 50 weeks
25	Training program in Burkina on ESIA and RAP Study ( <b>In country</b> )	Wo + 51 weeks
26	Training program in Mali on ESIA and RAP Study ( <b>In country</b> )	Wo + 52 weeks
27	Submission of Comments on Draft Report ESIA and RAP and on Draft Report ESIA and RAP for communities to be electrified in Ghana ( <b>Meeting</b> )	Wo + 53 weeks
28	Submission of Comments on Draft Report ESIA and RAP and on Draft Report ESIA and RAP for communities to be electrified in Burkina ( <b>Meeting</b> )	Wo + 54 weeks
29	Submission of Comments on Draft Report ESIA and RAP and on Draft Report ESIA and RAP for communities to be electrified in Mali ( <b>Meeting</b> )	Wo + 55 weeks
30	Submission of Draft Final Feasibility Study Report+ Briefing on Provisional Outcomes of ESIA and RAP Study + Briefing on Proposal and ESIA and RAP on Electrification of communities	Wo + 57 weeks
31	Submission of Comments on Draft Final Feasibility Study Report + Briefing on Provisional Outcomes of ESIA and RAP Study + Briefing on Proposal and ESIA and RAP on Electrification of communities ( <b>Meeting with TFPs</b> )	Wo + 59 weeks
32	Submission of Final Feasibility Study Report and updated proposal on Electrification of communities (if necessary)	Wo + 61 weeks
33	Submission of Final Report ESIA and RAP and Final Report ESIA and RAP for communities to be electrified for Ghana, Burkina and Mali	Wo + 61 weeks
34	Submission of Draft ESMP for Ghana, Burkina and Mali	Wo + 62 weeks
35	Submission of Comments on Draft ESMP for Ghana, Burkina and Mali ( <b>B to B Meeting</b> )	Wo + 64 weeks
36	Submission of Final ESMP and Final for Ghana, Burkina and Mali	Wo + 66 weeks
37	Submission of Non-technical ESIA and RAP Summary report for Ghana, Burkina and Mali	Wo + 67 weeks
38	Submission of Non-technical ESIA and RAP Summary report in Local Language for Ghana, Burkina and Mali	Wo + 67 weeks
39	Approval of Final Report ESIA and RAP by Permitting Authority in Ghana, Burkina and Mali	Wo + 71 weeks
40	Submission of Draft Final Bidding documents including Detailed design and Specifications for the Interconnection and Preliminary Design of Electrification of Communities	Wo + 72 weeks
4142	Submission of Comments on Draft Final Bidding documents including Detailed design and Specifications for the Interconnection and Preliminary Design of Electrification of Communities ( <b>Meeting</b> )	Wo + 74 weeks
4245	Submission of Report on Final updated Line Route (if necessary)	Wo + 75 weeks
46	Submission of Translated Final ESIA, ESMP, RAP, Non-technical Summary Reports for Ghana, Burkina and Mali	Wo + 75 weeks
47	Submission of Final Bidding documents including Detailed design and Specifications for the Interconnection and Preliminary Design of Electrification of Communities	Wo + 77 weeks
48	Submission of Draft Project Completion Report	Wo + 79 weeks
49	Submission of Comments on Draft Project Completion Report	Wo + 81 weeks
50	Submission of Final Project Completion Report	Wo + 82 weeks

## 6. DELIVERABLES

The Services by the Consultant include the preparation and submission in a **timely manner** of the reports, documents, maps and drawings in English and French. All documents, maps, drawings and reports shall be prepared in English and French, and shall be submitted by the Consultant simultaneously to the WAPP Secretariat and the utilities in each country. The reports shall be submitted under cover of official letter from the WAPP Secretariat. The Deliverables shall be

consistent with the packaging of the assignments. As part of the Deliverables, the Consultant shall support the concerned utilities to follow up with the relevant national agencies/ Ministries to secure approval of reports.

The Consultant, in addition to the events indicated above, shall make provisions in the proposals to take part in meetings, seminars, workshops, public consultations/sensitization campaigns and field trips to among others, obtain comments on all draft versions of reports with particular reference to (i) kick-off meeting of the Study (2 Meeting days), (ii) Draft Data Report and Line Voltage assessment (3 meeting days) (iii) Scoping Report and Stakeholder Engagement Plan - meetings shall be simultaneously held in each of the concerned countries) (1 Meeting day), (iv) Provisional Line Route Study Report (2 meeting days), (v) ESIA, ESMP and RAP Reports (4 meeting Days each – the meetings shall be held in each of the concerned countries), (vi) three (3) donor conferences (2 meeting Days each), (vii) Preliminary Feasibility Study Report (4 meeting days), (viii) Draft Final Feasibility Study Report (3 meeting days), (ix) Draft Bidding Documents (3 meeting days) and (x) one (1) Meeting of Ministers in charge of Energy in the concerned countries (3 Meeting Days). The Consultant shall cover its own costs for participating in the meetings while the Client shall support the costs related to the participation of the stakeholders and to the organization of the meetings.

As part of the examination of the Draft updated Provisional Line Route Study Report, the Consultant shall organize (and take part) simultaneously in each country, a field trip (5 Meeting days) of the utilities and the ministries in charge of energy concerned to visit the entire proposed line route and substations. For the draft Scoping Report, the Consultant shall make simultaneous visits to each of the utilities to hold meetings to collate comments. The outcomes of the discussions shall be captured in signed Minutes of Meeting with list of participants.

The Consultant shall note that the conduct of public consultations including Government and local administration Authorities, relevant national agencies, funding agencies, non-governmental organisations, communities impacted by the project, civil society, constitutes a Deliverable under this assignment. These public consultations shall be conducted in compliance with the applicable SEP throughout the entire study period and appropriately documented with among others, signed Minutes of Meeting, signed list of participants and photographs. Therefore, as part of the submissions of the Scoping Report, Line Route Study Report, ESIA Report, ESMP, RAP in their draft, provisional and final versions, the Consultant shall be required to submit as a separate annex, the signed minutes of meeting of all the public consultations conducted. The same shall apply for the scope of work relating to the Electrification of Communities/Towns/Villages.

The Client (WAPP/utilities) shall be responsible for submitting to the relevant Agencies/Ministries the applications for environmental permits and shall support the associated fees in accordance with the legislation in force in the country.

The Consultant shall note that situations may arise where the authorities in charge of environmental protection and the funding agencies make supplementary comments on Final Reports. In these instances, the Consultant shall incorporate the comments into revised Final Reports and re-distribute. The Consultant shall also be required to accompany Funding Agencies during their site visits and/or Appraisal Missions and provide any clarifications required.

In submitting amended reports and to facilitate their review, the Consultant shall, as part of the submission, prepare a matrix that indicates among others, the comments that were made, the

responses provided by the Consultant, and the page numbers of the amended report that contain the incorporated comments.

All reports, documentation, deliverables, maps and presentations by the Consultant shall be prepared in English and French and shall be in form and format acceptable to the WAPP Secretariat and the Funding Agency. All electronic versions of reports shall be submitted on USB keys and shall contain editable and non-editable versions of the reports. However, for the Scoping Report, ESIA, ESMP, RAP, Non Technical Summary, which are specific for each country only the final version for the report shall be translated in the other language.

Furthermore, For the Inception Report, Monthly Reports, Quarterly Reports, and Project Completion Report one common report (in English and French) for all countries will be prepared while for all the other reports (such as Scoping Report, Line Route Study Report, Environmental and Social Impact Assessment Report, Environmental and Social Management Plan, Resettlement Action Plan, Detailed Survey Report, Public Information and Sensitization Campaigns Report, and Non-Technical Summary Report) separate country-specific reports will be prepared for each of the three (3#) countries.

### **6.1. Inception Report**

The Consultant shall present according to the Schedule above, an Inception Report that shall contain, inter alia, the work plan and methodology, work schedule, annotated comments of each report that shall be presented and delivered to the WAPP Secretariat, GRIDCo, SONABEL AND EDM-SA. All electronic copies shall be on USB. The number of copies of the reports to be submitted shall be as follows:

- *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Three (3) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
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- *Three (3) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- 
- *Six (6) hard copies and one (1) electronic copy in English, and Six (6) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

### **6.2. Data Collection and Line Voltage Assessment Report**

The Consultant shall prepare a data report after the completion of the data collection and review task. The report shall include all technical and economic data on GRIDCo, SONABEL and EDM-SA networks, including single line diagrams of the HV transmission network and substations, and maps showing the HV transmission network and substations. The report shall also indicate the assumptions and input data for carrying out the Feasibility study. In addition, the report shall also specify the design criteria to be used for the engineering of the Interconnection Project. Furthermore, the report shall reflect a description of the operation and maintenance regimes of

GRIDCo, SONABEL and EDM-SA as related to HV networks. The Report shall also include the Line Voltage Assessment. The number of copies of the reports to be submitted shall be as follows:

- *Draft Report:*
  - *Five (5) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
  - *Five (5) hard copies and one (1) electronic copy in English to be delivered to the Ministry in charge of energy in Ghana.*
  - *Five (5) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
  - *Five (5) hard copies and one (1) electronic copy in French to be delivered to the Ministry in charge of energy in Burkina.*
  - *Five (5) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
  - *Five (5) hard copies and one (1) electronic copy in French to be delivered to the Ministry in charge of energy in Mali.*
  - *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*
- *Final Report:*
  - *Five (5) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
  - *Five (5) hard copies and one (1) electronic copy in English to be delivered to the Ministry in charge of energy in Ghana.*
  - *Five (5) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
  - *Five (5) hard copies and one (1) electronic copy in French to be delivered to the Ministry in charge of energy in Burkina.*
  - *Five (5) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
  - *Five (5) hard copies and one (1) electronic copy in French to be delivered to the Ministry in charge of energy in Mali.*
  - *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

### **6.3. Monthly Reports**

The report shall summarise the Consultant's activities during the period under review. The reports shall be issued in English and French by the 10<sup>th</sup> calendar day of each month for activities conducted in the preceding month. The number of copies of the reports to be submitted shall be as follows:

- *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Three (3) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
-

- *Three (3) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

The Consultant shall also prepare and maintain a Schedule using Microsoft Project and effect monthly updating of the detail schedules demonstrating that the project is progressing in accordance with the contractual obligations. The updated schedule shall be submitted as part of the Monthly Report.

#### **6.4. Quarterly Reports:**

The Consultant shall provide Quarterly Report. The reports shall describe the major tasks which have been undertaken in the performance of the studies, milestones towards the studies' completion, and percentage completion of the studies as at the end of the quarter. Financial data shall include photocopies of invoices from the Consultant as well as financial reports detailing expenditures of all funds and the daily rates of the Consultant, their hours worked and other direct costs. The reports shall be issued in English and French by the 10<sup>th</sup> calendar day after the end of the Quarter under review. The number of copies to the reports to be submitted shall be as follows:

- *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Three (3) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

#### **6.5. Project Master Schedule**

Prepare and maintain a Schedule using software acceptable to the Client (such as MS Project) and effect monthly updating of the detail schedules demonstrating that the project is progressing in accordance with the contractual obligations. The updated schedule shall be submitted as part of the Monthly Report.

#### **6.6. Line Route Study Report**

➤ *Draft Report on updated Provisional Line Route:*

- *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Three (3) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*

- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

➤ *Final Report on updated Provisional Line Route :*

- *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Three (3) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina. Three (3) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali. Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

➤ *Report on updated Final Line Route:*

- *Five (5) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Five (5) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

## **6.7. Feasibility Study Report**

All versions of the report (Draft, Final) shall contain an Executive Summary of not more than 10 pages. The Reports shall be delivered in a form (with cover page(s) and formatting) acceptable to the WAPP Secretariat, concerned utilities and Funding Agencies.

The number of copies of the reports to be submitted shall be as follows:

- *Preliminary Report:*

- *Five (5) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
  - *Five (5) hard copies and one (1) electronic copy in English to be delivered to the Ministry in charge of energy in Ghana.*
  - *Five (5) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
  - *Five (5) hard copies and one (1) electronic copy in French to be delivered to the Ministry in charge of energy in Burkina.*
  - *Five (5) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
  - *Five (5) hard copies and one (1) electronic copy in French to be delivered to the Ministry in charge of energy in Mali.*
  - *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*
- *Draft Final Report:*
    - *Five (5) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
    - *Five (5) hard copies and one (1) electronic copy in English to be delivered to the Ministry in charge of energy in Ghana.*
    - *Five (5) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
    - *Five (5) hard copies and one (1) electronic copy in French to be delivered to the Ministry in charge of energy in Burkina.*
    - *Five (5) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
    - *Five (5) hard copies and one (1) electronic copy in French to be delivered to the Ministry in charge of energy in Mali.*
    - *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*
- *Final Report:*
    - *Ten (10) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
    - *Ten (10) hard copies and one (1) electronic copy in English to be delivered to the Ministry in charge of energy in Ghana.*
    - *Ten (10) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
    - *Ten (10) hard copies and one (1) electronic copy in French to be delivered to the Ministry in charge of energy in Burkina.*
    - *Ten (10) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
    - *Ten (10) hard copies and one (1) electronic copy in French to be delivered to the Ministry in charge of energy in Mali.*
    - *Fifteen (15) hard copies and one (1) electronic copy in English, and Fifteen (15) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

## **6.8. ESIA, RAP, ESMP and RPF Reports**



### **6.8.1.Scoping Report**

The report shall be per country and shall be submitted as follows:

➤ *Draft Report:*

- *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Three (3) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

➤ *Final Report:*

- *Ten (10) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Five (5) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Ten (10) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Ten (10) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

### **6.8.2.Stakeholders Engagement Plan Report**

The report shall be per country and shall be submitted as follows:

➤ *Draft Report:*

- *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Three (3) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

➤ *Final Report:*

- *Ten (10) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*

- *Five (5) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Ten (10) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Ten (10) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

### ***6.8.3.Environmental and Social Impact Assessment Report and Resettlement Action Plan***

All versions of the report (Draft, Final Draft) shall contain an Executive Summary of not more than 10 pages. The final document should incorporate comments made during the training program. The final document should be delivered in a form (with cover page(s) and formatting) acceptable to the WAPP Secretariat, concerned utilities and Funding Agencies. The Report shall also contain an appendix recording the sessions of consultation that have been held with affected people and other stakeholders during the preparation of the report. The Report shall also contain in annex, the Final Report on the Provisional Line route.

The Report shall be submitted as follows:

#### ***➤ Draft Report:***

- *Five (5) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Five (5) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

#### ***➤ Final Draft Report:***

- *Twenty (20) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Five (5) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Twenty (20) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
- *Twenty (20) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

#### **6.8.4.Environmental & Social Management Plan (ESMP)**

All versions of the report (Draft, Final) shall contain an Executive Summary of not more than 10 pages. The final document should be delivered in a form (with cover page(s) and formatting) acceptable to the WAPP Secretariat, concerned utilities and Funding Agencies. The Report shall also contain an appendix recording the sessions of consultation that have been held with affected people and other stakeholders during the preparation of the report. The final document should incorporate comments made during the training program. The Report shall be submitted as follows:

➤ *Draft Report:*

- *Five (5) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Five (5) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina. Five (5) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali. Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

➤ *Final Report:*

- *Twenty (20) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Five (5) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Twenty (20) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina. Twenty (20) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Five (5) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali. Five (5) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

#### **6.8.5. Resettlement Policy Framework (RPF) mainly for electrification program**

#### **6.8.6. Non-technical Summary Report in Local Language.**

The Consultant shall be required to prepare a non-technical summary report of the impact assessments in the local languages in the areas involved as mandated by the Guidelines of Funding Agencies. The report shall contain a separate section on the ESIA, a separate section on the ESMP, and a separate section on the RAP. The Consultant shall be advised by GRIDCo in Ghana, SONABEL in Burkina and EDM-SA in Mali on the local languages to be used.

The Consultant shall also be required to perform informative meetings with the communities impacted by the project in all of the concerned countries after the Environmental and Social Impact Assessment and Resettlement Action Plan Study Final Reports have been approved. The informative meetings with the communities shall be held on dates to be defined by the WAPP Secretariat and national utilities.

The report shall be submitted as follows:

➤ *Draft Report:*

- *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Three (3) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

➤ *Final Report:*

- *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Three (3) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

#### **6.8.7. Non-technical Summary Report.**

The Consultant shall be required to prepare a non-technical summary report of the Environmental and Social Impact Assessments and Resettlement Action Plans in the areas involved that shall be

suitable for presentation to the Boards of Directors of the concerned utilities and Funding Agencies. The report shall cover all the countries and contain a separate section on the Line Route, a separate section on ESIA, a separate section on the ESMP, and a separate section on the RAP. The Report shall be delivered in a form (with cover page(s) and formatting) acceptable to the WAPP Secretariat, concerned utilities and Funding Agencies. The number of copies of the reports to be submitted shall be as follows:

➤ *Draft Report:*

- *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Three (3) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

➤ *Final Report:*

- *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Three (3) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*

**6.8.8. Translated Final Scoping, Final Draft ESIA, Final Draft ESMP, RPF, RAP, and Non-Technical Summary Reports**

- *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Three (3) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Mali.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

## **6.9. Bidding Documents including Detailed design and Specifications for the Interconnection as well as Preliminary Design of Electrification of Communities**

The number of copies of the documents to be submitted shall be as follows:

- *Draft Final Bidding Documents:*
  - *Five (5) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
  - *Five (5) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
  - *Five (5) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
  - *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*
- *Final Bidding Documents:*
  - *Ten (10) hard copies and one (1) electronic copy in English to be delivered to GRIDCo*
  - *Ten (10) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
  - *Ten (10) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
  - *Twenty (20) hard copies and one (1) electronic copy in English, and Twenty (20) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

The draft and final Bidding Documents shall be delivered in a form and formatting acceptable to the Client and the Funding Agency (ies).

## **6.10. Terms of Reference of Owner's Engineer**

The number of copies of the documents to be submitted shall be as follows:

- *Draft Terms of reference*
  - *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
  - *Three (3) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
  - *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina. Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*
- *Final Terms of reference*
  - *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
  - *Three (3) hard copies and one (1) electronic copy in English to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Ghana*
  - *Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*

- *Three (3) hard copies and one (1) electronic copy in French to be delivered to each of the Ministries in charge of Energy and Environmental Protection in Burkina.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

#### **6.11. Project Completion Report**

The Consultant shall submit a draft Project Completion Report that summaries among others, the activities undertaken by the Consultant within the framework of the Study, Deliverables submitted, disbursements received, issues encountered, and lessons learnt to be taken into consideration in future studies.

The number of copies of the documents to be submitted shall be as follows:

➤ *Draft Project Completion Report:*

- *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

➤ *Final Project Completion Report:*

- *Three (3) hard copies and one (1) electronic copy in English to be delivered to GRIDCo.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to SONABEL.*
- *Three (3) hard copies and one (1) electronic copy in French to be delivered to EDM-SA.*
- *Five (5) hard copies and one (1) electronic copy in English, and Five (5) hard copies and one (1) electronic copy in French, to be delivered to the WAPP Secretariat.*

In addition to the above highlighted, the Consultant shall note that the draft and final Project Completion Reports shall be delivered in a form, formatting and content acceptable to the Client and the Funding Agency(ies).

#### **6.12. Maps and Drawings**

In addition to the above requirements, one (1) hard copy as well as three (3) USBs in the latest stable version of AUTOCAD of each map and drawing shall be submitted to each of the above-indicated Ministries in charge of energy, utilities and WAPP Secretariat. The hard copy should be on Unotrace drafting film - 75 micron - 0.003" paper (transler paper). All costs associated with the procurement and preparation of the maps and drawings shall be deemed to be included in the Financial Proposal of the Consultant.

### **7. KEY PERSONNEL**

The level of effort for the assignment is estimated at 100 man-months.

The minimum required experience of the key staff is:

- (a) Title : **Project Manager**  
Expected Level Of Effort (Person-Month) : 16.....  
Years of Professional Experience : 15  
Participation in among others Kick off meeting, Scoping report validation meeting, Field trip to inspect Provisional Line Route, Provisional Line Route Report Validation Meeting, Meeting to examine Draft ESIA, ESMP & RAP Reports, Meetings to examine Draft Final Feasibility Study Report and Draft Final Bidding documents, Donor Consultation Meetings, Training Workshops, Meetings at national level to adopt reports, Public Information and Sensitisation in each country, Meeting of Ministers in charge of Energy. Day to day management of the technical and environmental and social studies.
- Specific Expertise : Conducted HT Network feasibility studies or ESIA studies and prepared Resettlement Action Plans in the same capacity on at least three (3) 225 kV and above transmission line projects that included Line Route Studies. The length of the line should be at least 200 km and at least one of the projects should be in Africa. Working knowledge of English or French is required
- (b) Title : **Geodetic Engineer / Surveyor**  
Expected Level Of Effort (Person-Month) : 4.....  
Years of Professional Experience : 10  
Participation in among others Kick off meeting, Scoping report validation meeting, Provisional Line Route Report Validation Meeting, One of the Donor Consultation Meetings, Training, Public Information and Sensitisation in each country.
- Specific Expertise : Surveyed or managed the survey of line routes of at least three (3) 161 kV and above transmission line projects. The length of the line should be at least 200 km, and at least one of the projects should be in Africa. Experience with LIDAR is required. Working knowledge of English and French is an advantage
- 12c12 Years of Professional Experience : 12  
Participation in among others Kick off meeting, Scoping report validation meeting, Field trip to inspect Provisional Line Route, Provisional Line Route Report Validation Meeting, Meeting to examine Draft ESIA, ESMP & RAP Reports, Donor Consultation



Specific Expertise	Meetings, Training Workshops, Meetings at national level to adopt reports, Meeting of Ministers in charge of Energy.
	: Conducted ESIA studies in the same capacity on at least three (3) 161 kV and above transmission line projects one of which should be in Africa. Experience with International Financing Institutions Environmental and Social Safeguards (including World Bank and IFC) is required Working knowledge of English and French is required
(d) Title	: <b>Resettlement/Social Safeguards Specialist</b>
Expected Level Of Effort (Person-Month)	: 12
Years of Professional Experience	: 12
Participation in among others	Kick off meeting, Scoping report validation meeting, Field trip to inspect Provisional Line Route, Provisional Line Route Report Validation Meeting, Meeting to examine Draft ESIA, ESMP & RAP Reports, Donor Consultation Meetings, Training Workshops, Meetings at national level to adopt reports, Meeting of Ministers in charge of Energy.
Specific Expertise	: Conducted Sociological and anthropological investigations. Involved in the development of Resettlement Action Plans in the same capacity for at least three (3) 161 kV and above transmission line projects, one of which should be in Africa. Experience with International Financing Institutions Environmental and Social Safeguards (including World Bank and IFC) is required. Working knowledge of English and French is required
(e) Title	: <b>Biologist (Specialist in fauna)</b>
Expected Level Of Effort (Person-Month)	: 2
(f) Title	: <b>Biologist (Specialist in flora)</b>
Expected Level Of Effort (Person-Month)	: 3
Years of Professional Experience	: 8
Participation in among others	Kick off meeting, Scoping report validation meeting, Field trip to inspect Provisional Line Route, Provisional Line Route Report Validation Meeting, Meeting to examine Draft ESIA, ESMP & RAP Reports, One of the Donor Consultation Meetings.

Specific Expertise	: Conducted ecological studies and floral biodiversity surveys, including threatened and endemic species on the IUCN Red List in projects that required environmental permitting. Involved in the development of ESIA studies in the same capacity for at least two (2) 161 kV and above transmission line projects that included Environmental and Social Management Plans, one of which should be in Africa. Experience with International Financing Institutions Environmental and Social Safeguards (including World Bank and IFC) is required Working knowledge of English and French is an advantage.
(g) Title	: <b>Transmission Planning Engineer</b>
Expected Level Of Effort (Person-Month)	: 4
Years of Professional Experience	: 10
Participation in among others	Kick off meeting, Data collection exercise, data validation meeting, Network modelling validation, training at home office, Preliminary Report adoption, Provisional Report adoption, ,
Specific Expertise	: Involved in design and implementation of at least three (3) 225 kV and above transmission line projects including Feasibility Studies, Network simulations and analyses, Preliminary Designs and Tender documents preparation. The length of the line should be at least 200 km and at least one of the projects should be in Africa. Working knowledge of English and French is required.
(h) Title	: <b>Transmission Line Design Engineer</b>
Expected Level Of Effort (Person-Month)	: 5.....
Years of Professional Experience	: 10
Participation in among others	Kick off meeting, Data collection exercise, Scoping report validation meeting, Field trip to inspect Provisional Line Route, Provisional Line Route Report Validation Meeting, Network modelling validation, training at home office, Preliminary Report adoption, Donors Consultation Meetings, draft Bidding Document adoption
Specific Expertise	: Involved in design and implementation of at least three (3) 225 kV and above transmission line projects including Feasibility Studies, Preliminary Designs and Tender documents preparation. Experience in rural electrification schemes involving shield-wire technology is also required. The length of the line should be at least

200 km and at least one of the projects should be in Africa. Working knowledge of English and French is required.

- (i) Title : **Substation Design Engineer**  
 Expected Level Of Effort (Person-Month) : 5  
 Years of Professional Experience : 10  
 Participation in among others Kick off meeting, Data collection exercise, Network modelling validation, training at home office, Preliminary Report adoption, Donors Consultation Meetings, draft Bidding Document adoption  
 Specific Expertise : Involved in design and implementation of at least three (3) 225 kV and above substation and switchgear projects including Feasibility Studies, Preliminary Designs and Tender documents preparation. Experience in rural electrification schemes involving shield-wire technology is also required. At least one of the projects should be in Africa. Working knowledge of English and French is required.
- (j) Title : **Protection and Control Engineer**  
 Expected Level Of Effort (Person-Month) : 3  
 Years of Professional Experience : 10  
 Participation in among others Kick off meeting, Data collection exercise, Network modelling validation, training at home office, Preliminary Report adoption,  
 Specific Expertise : Involved in design and implementation of at least three (3) 161 kV or more and above substation and/or switchgear projects including Feasibility Studies, Preliminary Designs and Tender documents preparation. At least one of the projects should be in Africa. Working knowledge of English and French is required.
- (k) Title : **Economic and Financial Analyst**  
 Expected Level Of Effort (Person-Month) : 4  
 Years of Professional Experience : 10  
 Participation in among others Kick off meeting, Data collection exercise, data validation meeting, training at home office, Preliminary Report adoption, Provisional Report adoption, Donors Consultation Meetings, Meeting of Ministers in charge of Energy

Specific Expertise	: Involved in the economic, financial, risk, and sensitivity analyses of at least three (3) 161 kV or more and above transmission line projects. At least one of the projects should be in Africa. Working knowledge of English and French is required.
(l) Title	: <b>Communication and SCADA Engineer</b>
Expected Level Of Effort (Person-Month)	: 3
Years of Professional Experience	: 10
Participation in among others	Kick off meeting, Data collection exercise, Network modelling validation, training at home office, Preliminary Report adoption
Specific Expertise	: Involved in the design and implementation of SCADA and communication facilities in at least three (3) 161 kV or more. At least one of the projects should be in Africa. Working knowledge of English and French is required.
(m) Title	: <b>Procurement Specialist</b>
Expected Level Of Effort (Person-Month)	: 3
Years of Professional Experience	: 10
Participation in among others	Training at home office, Donors Consultation Meetings, Draft Bidding Document adoption
Specific Expertise	: Involved in the Tender document preparation of at least three (3) transmission line projects, one of which should be in Africa. Working knowledge of English and French is required.
(p) Title	: <b>Line/Substation Distribution Engineer</b>
Expected Level Of Effort (Person-Month)	: 1
Years of Professional Experience	: 10
Participation in among others	Identification of provisional routes for medium voltage networks and substation locations, Recommendation on technology mode for achieving rural electrification, Proposal on least cost solution to achieve rural electrification.
Specific Expertise	: Involved in the design of at least three (3) 33 kV and above transmission line projects, one of which should be in Africa. Working knowledge of English and French is

an advantage. Demonstrated expertise in shield-wire electrification schemes shall also be an advantage.

The Consultant is very strongly encouraged to have local teams in each of the concerned countries to facilitate the execution of the assignment.

## **8. INFORMATION TO BE PROVIDED BY THE WAPP SECRETARIAT, GRIDCo, SONABEL AND EDM-SA**

The WAPP Secretariat, GRIDCo, SONABEL and EDM-SA shall provide the following:

- Information on the existing electricity networks in each country.
- ECOWAS Master Plan for the Development of Regional Power Generation and Transmission Infrastructure 2019 – 2033
- WAPP Operations Manual
- WAPP Transmission Tariff Methodology

## **9. REPORTING REQUIREMENTS**

The Consultant shall report to the WAPP Secretariat. However, each of the utilities involved, GRIDCo, SONABEL and EDM-SA, shall appoint a Project Manager who shall co-ordinate the activities of the Consultant in Ghana, Burkina and Mali respectively.

All correspondences on the project from the Consultant addressed to any party should be copied to the other three (3) parties for their information.

## **10. CONDUCT OF WORK**

The Consultant shall provide overall management of all aspects of the work / services.

The Consultant shall work closely with the designated staff of the WAPP Secretariat, GRIDCo, SONABEL and EDM-SA.

The Consultant shall participate in meetings with the WAPP Secretariat, GRIDCo, SONABEL and EDM-SA.

The Consultant shall implement its internal quality control and assurance procedures during the execution of the Contract, and shall demonstrate that they are being applied.

## **11. PARTICIPATION OF WAPP, GRIDCO, SONABEL AND EDM-SA**

The WAPP Secretariat, GRIDCo, SONABEL and EDM-SA shall provide to the contracted Consultant if required;

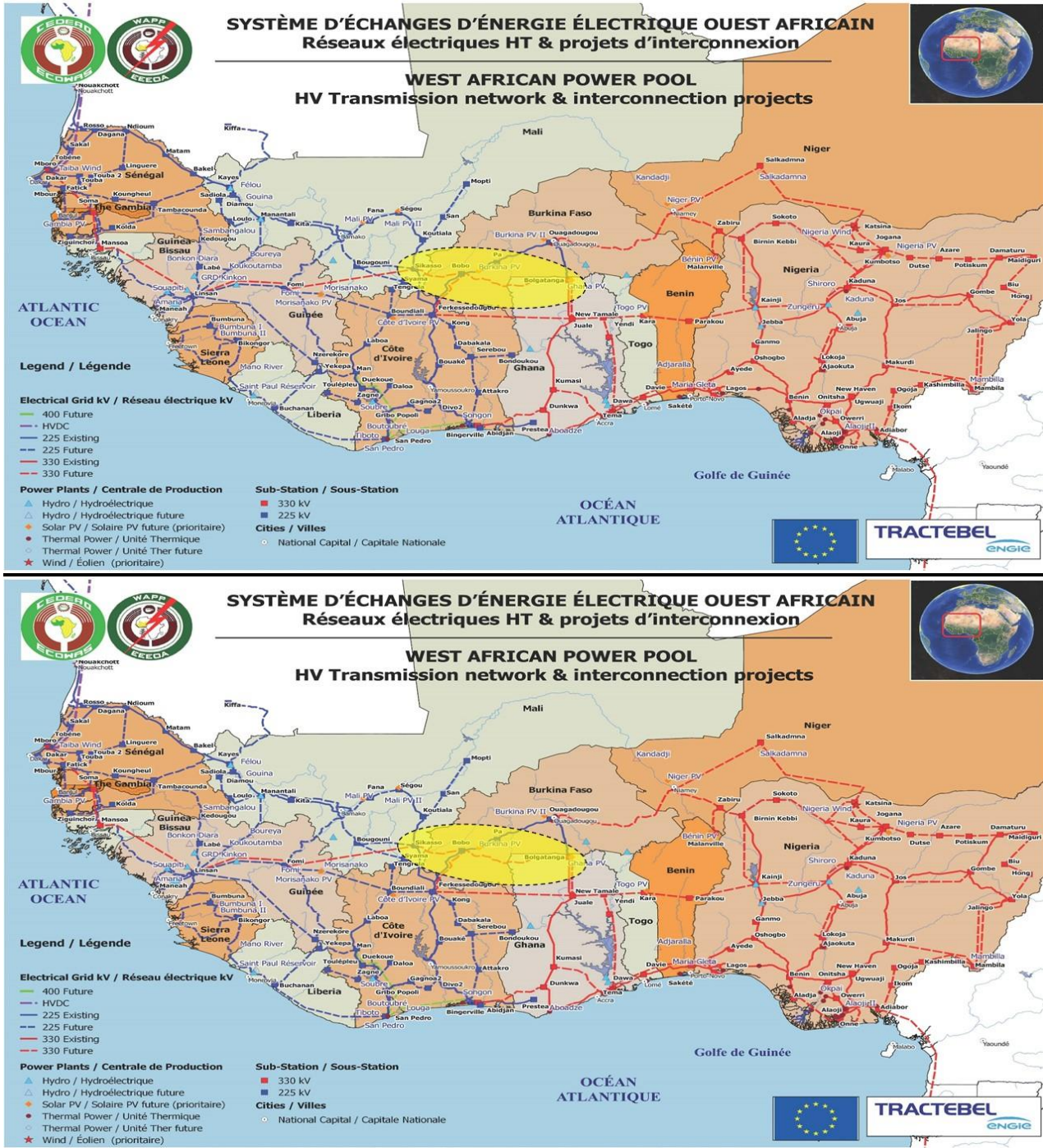
- One (1) Office, suitably furnished and with air conditioning. All related utility consumption charges shall be the responsibility of the Consultant.

- Arrangements for meetings with representatives of WAPP, GRIDCo, SONABEL and EDM-SA.

The Consultant shall make his own arrangements in coordination with the WAPP Secretariat for whatever services that the WAPP Secretariat cannot provide.

# **APPENDICES** **APPENDIX 1: MAP OF PROPOSED INTERCONNECTION** *(TO BE VALIDATED BY LINE ROUTE STUDY)*

*This map is only indicative. The actual route and distance of the line, together with the location of the substations, shall be based on the outcomes of the Line Route and ESIA Study*







## **APPENDIX 2: SAFETY RULES FOR THE FELLING TREES**

The following precautions shall be observed while felling trees:

- In locations where ordinary felling operations might cause damage to property including transmission lines, trees shall be suitably dismembered and felled using block and tackle when necessary.
- Whenever practicable, trees shall be felled directly away from a power or telephone line after having removed all limbs that might contact the line or cause damage to other trees or property. If the tree must be felled toward a line it shall be topped low enough to clear all conductors, etc.
- Pulling down trees or lowering limbs by means of attachment ropes connected to a moving motor vehicles is prohibited. The tackle must be anchored to a fixed object such as a suitable tree, a truck with its wheels blocked or a stake holdfast.
- Guy ropes shall be used on all trees that are sufficiently large to cause damage should they fall in any direction other than that intended. The guy ropes shall be able to stand well outside the striking distance of the tree.
- Anchors for guy ropes shall be installed in such a position that person handling the guy ropes shall be able to stand well outside the striking distance of the tree.
- Before a tree is felled, men other than those actually engaged in cutting the tree shall keep clear of any area within the possible striking distance of the tree. Men shall not be allowed to remain in nearby trees if there is any doubt as their safety.
- Ample warning shall always be given before a tree is expected to fall and the workmen must stand clear in case the tree springs from the stump while falling.
- Brush and other debris or equipment that would hamper free movement when using sharp tools or when getting clear in case of emergency shall always be cleared away.
- Ordinary, trees shall be notched in the direction towards which they are to fall and sufficient holding wood shall be left to provide control.
- Under no circumstances shall a partially cut tree be left standing during a lunch hour or overnight.
- Before commencing the backcut on a tree, one or more pieces of log chain or guy cable shall be placed tightly around the tree if the tree is split, leaning or has a twin trunk that is likely to split. One chain or cable shall be placed above and as close as practical to the backcut to prevent separation of the trunk.
- The Consultant shall satisfy himself that any employee permitted to operate a power chain saw is qualified to do so.
- Before the felling of any tree which may get into contact with the conductors on the existing lines, the nearest manned substation shall be advised. This substation should be contacted in the event of any mishap or problem during the felling.