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AFRICAN DEVELOPMENT BANK GROUP

**PROJECT : Kribi Power Project 216MW Gas Plant
 & 225kV Transmission Line**

COUNTRY : Cameroon

SUMMARY OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

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ABBREVIATIONS

| | |
|---------------|---|
| ARSEL | Agence de régulation du secteur de l'électricité |
| CPF | Central Processing Facility |
| EIA | Environmental Impact Assessment |
| EMF | Electromagnetic Fields |
| EMP | Environmental Management Plan |
| ESIA | Environmental and Social Impact Assessment |
| GDP | Gross Domestic Profit |
| ICNIRP | International Commission on Non-Ionising Radiation Protection |
| IFC | International Finance Corporation |
| NIS | National Institute of Statistics |
| PPA | Power Purchasing Agreement |
| RAP | Resettlement Action Plan |
| SIA | Social Impact Assessment |
| SIG | Southern Interconnected Grid |
| SMP | Social Management Plan |
| SNH | National Hydrocarbons Company |
| SW | Scott Wilson |
| WHO | World Health Organisation |

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1. INTRODUCTION

AES SONEL, the national power utility of Cameroon, is currently developing the Kribi Power Project. The project is designed to meet expanding electricity demands and is part of a medium-term strategic development programme for the supply of electricity in Cameroon. The Project will be located in the equatorial region of Cameroon. It will comprise the construction of a 216 MW gas fired power plant, approximately 9 km northeast of Kribi, and the erection of a 100 km long 225 kV transmission line between the plant and the existing Magombe 225/90 kV substation at Edéa. The Project will be fuelled by natural gas from the Sanaga sud offshore gas field. The Project will be owned by a subsidiary of AES SONEL and all the electricity produced will be delivered to the Southern Interconnected Grid (SIG) and sold to AES SONEL through a Power Purchasing Agreement (PPA).

The Sanaga Sud gas field located at approximately 14 km offshore northwest of Kribi has been selected by SNH (National Hydrocarbons Co) to be developed in parallel for the supply of gas to the power plant. Perenco Cameroun S.A. is the operator and is negotiating a Production Sharing Contract with the State and a Gas Sales Agreement with AES SONEL. The Sanaga South field and the gas pipeline are not part of the present project and are subject to separate Environmental and Social Impact Assessments. The ESIA for Sanaga gas field and the gas treatment plant at Eboudavoyé 9 km north of Mpolongwé was conducted by Perenco Cameroon S.A. in partnership with the Royal Haskoning (The Netherlands) and ERE Développement (Cameroon) and approved by the Ministry of Environment of Cameroun. The ESIA for the gas pipeline is currently on going and will be available soon.

In line with the requirements of the Ministry of Environment and Protection of Nature, AES SONEL commissioned Scott Wilson (SW), an international environmental and engineering consultancy, to undertake the ESIA for the Kribi Power Project. The ESIA study and reports have been undertaken to both Cameroonian legislation and internationally recognised guidance and standards adopted by African Development Bank, World Bank and International Finance Corporation performance standards. The Project is classified as a “Category 1” under the Bank’s Environmental and Social Assessment Procedures (ESAP), primarily because the project will require some economic or physical displacement as well as land acquisition. As such, the ESIA has been undertaken within the requirements of Cameroonian Legislation as set out in EIA Decree No. 2005/0577 of 23rd February 2005, Bank’s ESAP, World Bank OP 4.01 and the IFC Performance Standards. The Ministry of Environment and Protection of Nature formally approved the Environmental and Social Impact Assessment (ESIA) Report (Scott Wilson, October 2006) for the Kribi Power Project on 5 April 2007. An addendum to the ESIA Report has therefore been produced to take into consideration the revisions to the Plant design since the preparation of the ESIA report: the use of nine reciprocating engines in the place of the four gas turbines assessed within the ESIA moving from 150 to 216 MW, and the movement of the plant site approximately 200 m to the east of the location assessed within the ESIA. This places the proposed power plant further from the road and the adjacent village of Mpolongwe.

2. PROJECT DESCRIPTION AND JUSTIFICATION

2.1 PROJECT DESCRIPTION

The Kribi Power Plant Project will comprise:

- **The Power Plant** - the construction of a 216 MW power plant fuelled with natural gas at the Mpolongwe Site
- **Energy Transmission Facilities** - the construction of energy transmission facilities comprising:
 - (i) a step-up substation (11 to 225 kV) at the plant site at Mpolongwe;
 - (ii) a circa 100 km 225 kV double circuit transmission line between the plant and the Mangombe 225/90 kV substation at Edéa;
 - (iii) the connection of the transmission line at the Mangombe substation with installation of new 225 kV line bays.

The design life of the plant is 25 years.

2.1.1 The Power Plant

The Site

The Mpolongwé area will contain the proposed plant site. This area lies approximately 9 km north of Kribi and is adjacent to the main road about 1 km inland from the coast. The plant itself will occupy almost 4 ha within an overall 16 ha area, which will also allow the development of a construction compound for the project. An office building, welfare facilities, workshops and stores will also be constructed at the plant site.

The site is predominantly covered by secondary forest. There are also a number of homes owned by fishermen on the western edge of the site within the way leave of an existing 90 km power line. Three families live in these buildings have been identified. The Mpolongwé River and two of its tributaries drain the proposed site. They are perennial and are used as a water source by local inhabitants. The Government has granted AES SONEL the right to use this untitled land under a Public Utility Decree, which was signed in August 2005.

Power Plant Equipment

The power plant has been designed comprises nine simple cycle gas turbines installed as base case for this study. Each of the turbines will have an individual emission stack about 20 m high. The cooling systems for the gas turbines will be with air or by water in closed circuits. Therefore, the closed circuits system will only require make up water. Overall water demand for the process operations is estimated at approximately only 2 to 3 m³ per month. Process water for the system can be supplied either from the streams adjacent to the site or from on-site boreholes. The power plant will use the treated gas coming from the Central Processing Facility (CPF) at Eboudawé and turn it into electricity. There will be a pipeline to transport the gas from the CPF to the power station in Mpolongwé. No gas storage on site is planned so the turbines will be dual-fuel (gas and diesel) to ensure there is a continuous power supply if gas is unavailable. On-site diesel tanks will have an approximate capacity of 2000m³. This will be sufficient to keep the plant running at full capacity for 7 to 8 days. It is anticipated that continuous operation using diesel will not exceed 8 days per year at a maximum 30% load factor.

Step-up Station and Local Power Supply Demand

Power will be exported from the site via a new 225 kV double circuit transmission line. A step-up substation will be built for connection to the transmission line. At the Mangombe substation, at Edéa, new 225 kV bays will be added to connect the new line to the existing grid.

2.1.2 The Transmission Line

The transmission line will be 99.5 km in total length. The line will be constructed within a corridor (wayleave), which will be a total width of 30 m, i.e. 15 m each side of the line axis. Along the transmission line, towers will be spaced at a nominal distance of 350 m and a total of approximately 285 towers will be required. The towers will be approximately 40 m high and the line will be double circuit. There is already an existing 90 kV transmission line, which runs from Edéa to Kribi. The new line will follow this general route for approximately 90% of the distance and runs directly parallel for 40%. This will enable the length of new way leave to be reduced as the lines will be able to share the way leave where parallel. As the existing and new line also follow the main road, access to the line corridor will be easily managed. Only a few, new, short access tracks will be required to gain access to the towers for construction.

The selected route passes through secondary tropical forest (approximately 30-40% of the route), fallow lands for 40-50% and subsistence style farmland for approximately 20%. The area is sparsely inhabited, and this route was selected to avoid as far as possible crossing the villages and forest areas. A total of 25 villages have been identified along the route.

It should be noted that the project involves the installation of a power plant and a 225 kV line only. It does not cover local power distribution. Transmission from this high voltage line to villages within the project area is not practical and is outside of the scope of this assessment although; provision of electricity is a key concern of the local communities.

The majority of affected villages are now supplied with electricity, and AES SONEL is setting out a separate programme to increase the number of customers (about 50,000 per year) as part of the concession agreement. Most of the population will benefit from this programme. As part of this, AES SONEL plans to build new 30 kV lines from the existing 90 kV line.

The availability and use of electricity is very varied in the project area. A large number of villagers have access to electricity although not all the houses are connected to electricity networks. According to the survey and site observations, the majority of villages have the capacity to access electricity. What is meant by capacity is that many households may have the technology to connect to pylons, but they may not have the money to pay electricity bills or the pylons have gone into disrepair and have ceased to be connected to a national grid. Some wealthier households may have their own generators thus making them independent of the local electricity infrastructure. The village of Dehane has no electricity capacity at all.

2.2 PROJECT JUSTIFICATION

The country of Cameroon faces a serious problem of energy supply, and especially electricity supply. It is expected that if no other power is supplied, the country will encounter extreme shortage of electricity in three years time. The hydro plants are located at Song Loulou and Edéa on the Sanaga river and at Lagdo for the Northern Interconnected Grid. These hydro plants have an installed capacity of approximately 723 MW. At present there are three reservoir dams at

Mbakaou, Bamendjin and Mape to regulate the flow in the Sanaga River. These reservoirs have a combined capacity of 7.6 billion cubic metres.

Because of the large variability of natural flows on the river (over 6000 m³/s during the wet season and less than 100 m³/s during the dry season), three upstream storage dams have been built to regulate flows during the dry season. In addition to the hydro capacity of circa 665 MW on the southern grid, the SIG has six thermal plants with a total installed capacity of circa 170 MW to provide additional power mainly for system security and peaking.

The demand growth on the SIG in conjunction with lower than average hydrology resulted in severe power shortages and recurrent dry season load shedding during the three years up to 2004. To help solve this problem, in 2002 - 2003 AES SONEL built several small high speed diesel plants totalling 47 MW and an 85 MW heavy fuel oil (HFO) plant at Limbe. They were commissioned in September 2004.

With an increase in demand of about 5% per year, there is a need to build new production facilities in order to satisfy the mid-term demand and provide greater security for the electricity supply.

Therefore, the Kribi gas-fired power project is proposed to meet the demand and provide greater grid security.

3. LEGAL AND ADMINISTRATIVE FRAMEWORK

The ESIA has identified the relevant Cameroonian statutory requirements, regulations, permits and licences required for the development to proceed. The key EIA legislation is Decree No. 2005/0577 of 23rd February 2005, which defines the process for undertaking EIA and Ministerial Order No. 0069/MINEP of 8th March 2006, which defines the categories of operations subject to EIA.

Consultation for the ESIA has also been undertaken in accordance with the requirements of the EIA Decree of Cameroun 2005 / 0577, which requires:

- The determination of the acceptability of the EIA, which involves consultation and public hearings and which will also include meetings undertaken during the study.
- The proponent to provide 30 days notification prior to the first consultation meeting.
- Minutes of meetings to be included in the EIA report.
- After confirmation of acceptability of the EIA report, public hearing to be undertaken. Following 30 days, a report of the findings is presented to the Minister.

As there are no existing national standards in Cameroun for water quality, air quality and noise limits, international standards specifically the World Bank's Environmental, Health and Safety guidelines and the World Health Organisation guidelines have been adopted for this ESIA.

The relevant institutions that implement and monitor environmental laws in Cameroon are:

- The Inter-Ministerial Committee of Environment;
- National Consultative Commission of environment and sustainable development;
- The Ministry in charge of the Environment.
- The Ministry in charge of Energy and Water Resources and
- Agence de Régulation du Secteur de l'Electricité (ARSEL);

Other ministries include the Ministries of Agriculture, Transport, Culture, and Land Use Planning and Housing. The ESIA report also identifies the international environmental and social Protocols, Agreements and Treaties and three regional agreements.

4. DESCRIPTION OF THE PROJECT ENVIRONMENT

4.1 TOPOGRAPHY

The project area itself is primarily within the lowland hills with a rural landscape of secondary rainforest and intermittent farming activity. The topography is one of very low rolling hills or hillocks and shallow valleys. The plant site lies at approximately 10 m to 20 m above sea level with the entire 100 km transmission line generally below 100 m above sea level. Villages and associated land clearance are present along the transmission line route however; the natural forest vegetation dominates the landscape character of the area.

4.2 CLIMATE

The entire project will be located in the equatorial region of Cameroon, characterised by primary and secondary forests, with average temperatures of about 28°C and humidity between 60 and 100%. Generally the area has a dry season from approximately November to March, light rains from April to May and a rainy season from June to October. Overall the project area is within a region of high average annual rainfall with total of approximately 3,000 mm.

4.3 GEOLOGY and SOILS

The dominant rock type within the project area is gneiss. The soils are generally deep intensively weathered materials with sandy surface horizons becoming more clayey with depth. Soils are physically stable and well structured giving good drainage characteristics with relatively high permeability. They are poor with low pH values, poor nutrient status and low cation exchange capacities. Due to this poor nutrient status, soils tend to be used for shifting agricultural and need artificial fertiliser if permanent farming is to be practised. Land use capability is therefore low.

4.4 HYDROLOGY and HYDROGEOLOGY

As noted above, the project area is predominantly low lying, gently undulating ground bisected by numerous small streams and rivers. Soils in the coastal belt are in part sandy in texture with high permeabilities. Taking account of the low lying nature of the area, the presence of permeable soils, the prevalence of surface water system and the high rainfall of the area, it is concluded that shallow groundwaters will be present across the whole project area. Data from boreholes on the plant site show that the groundwater is present at approximately 8 m below surface although seasonal fluctuation of the water table may occur in response to rainfall.

4.5 LAND USE

Land use, both within the plant site area and along the wayleave for the transmission line, is dominated by forest cover. This cover has been impacted by human activity (clearing or partial clearing) to a varying degree and is considered to comprise secondary rain forest. The secondary land use is subsistence agriculture with small areas of cleared forest used for growing banana, palm oil trees, cassava and other staple crops. Within the plant site one small clearing for agricultural use was evident and areas of clearance are common around the villages that exist along the transmission line wayleave. Initial estimates indicate that approximately 80% of the project area is secondary rainforest with the remaining being primarily agricultural clearing. The main exception to this general pattern of subsistence farming is the presence of one large, commercial scale oil palm plantation run by Ferme Suisse, approximately 35 km south of Edéa. Around the outskirts of Edéa, the land use is predominantly agricultural in nature with most forest cleared for generally small-scale subsistence farms and occasional plantation.

4.6 BIODIVERSITY

To confirm the status of the project area baseline ecological surveys were undertaken by Scott Wilson.

The plant site covers an area of 16 ha consisting of recent scrubby fallows, old fallow and patches of disturbed forest. A small proportion of the site is occupied by cultivated crops including banana and cassava. Fallow areas are generally covered with pioneer vegetation and have a low conservation value.

The patches of natural forest have been heavily disturbed. However the disturbed forest still has some ecological value. They support habitats with rare plants and are habitats for small animals but have little importance for larger wildlife species. Within the sampled area a total of 499 trees of diameter bigger than 10 cm were recorded with a total of 94 species. *Coelocaryon preusii* is the most abundant species with a total of 53 stems. The others abundant species were *Tabernaemontana crassa*, *Santiria trimera*, *Anthonotha macrophylla* and *Dichostemma glaucescens*.

In addition to the species recorded within plots, some important species with diameter less than 10 cm have been collected. These are *Rinorea verrucosa*, *Rinnorea longisepala* and *Rinorea mezilii*.

The transmission line will cross several habitat types. The most common are: disturbed Riverine forest, disturbed swamp forest, disturbed *Raphia* forest, fallows of various ages and mature forest on rocky soil. It was found from baseline ecological surveys that despite severe degradation, some large trees are still present as is the case for *Antrocaryon micraster* and *Hallea ciliata*. Some areas are still relatively well forested with rich flora. These patches of forest still host a few species of important conservation value e.g. *Cola hypochrysea*, *Cola filicifolia* and many species belonging to the genus *Rinorea*. These two plots show the best structure of natural forest within the survey area. *Antrocaryon micraster* was the biggest tree identified with a 119 cm diameter.

Allexis caulliflora, *Rinorea kamerunensis*, *Podococcus barteri*, are smaller plants but with important conservation value and diameter less than 10 cm.

A total of 150 species with diameter bigger than 10 cm have been recorded, 94 within the Plant Site and 114 along the Transmission Line, some species being common to both.

The key bio-indicator groups found are :

(i) **2 Species** (*Rinorea mezili* sp found in the plant site and in some plots along the transmission line) as **Endemic to Cameroon** and

(ii) **5 species** (*Drypetes preussii*: found in Cameroon and SE Nigeria, *Leonardoxa africana*: Found in SE Nigeria, Cameroon, North Gabon, and *Rinorea verrucosa*, *Rinorea longisepala*, *Rinorea kamerunensis*) as **Sub-endemic**.

The evaluation of Conservation potential noted that only 15 species from the 150 identified (10%) are **vulnerable**, with moderate impacts from loss and **only 1 endangered**. The great majority of the 150 recorded species have very low important conservation value. A large majority of plant species identified within the project are used as food, medicine and construction materials.

The Kribi region is known to contain a large number of animal species, including large mammals such as forest elephants, chimpanzees, Western lowland gorillas and mandrills, of which mainly

the species in the Campo Ma'an National Park and to a lesser extent in the Doula-Edea wildlife reserve have been reasonably documented.

With regard to avian fauna, the presence of red-tailed grey parrots as well as large variety of (migratory) water birds is indicated. Among the 924 bird species observed or heard in Cameroon, 300 have been observed in the southern-western part of the country.

Due to the level of disturbance and the presence of villages along the project area, **the fauna is restricted to small mammals, snakes and insects**. There are no faunal species specifically associated with this disturbed habitat, most animals found usually being associated with the neighbouring forest.

None of the animals identified during this survey are protected species and as such they do not have direct importance in terms of their conservation value. In terms of their fauna, the plant site and the transmission line therefore have a low conservation value. Most species recorded were also from the surrounding forest and not directly from the habitats within the project area. However they are used by the local population for both food and as a source of income (sale of meat). Most of the endangered larger mammals, reptiles and birds are absent even in the neighbouring forest.

4.7 ARCHEOLOGY, CULTURAL HERITAGE and PROTECTED AREAS

A review of the topographic and tourist mapping of the area was undertaken along with a site visit to provide an initial overview of any identified areas or features of archaeological and cultural heritage importance. Based on the maps used no features are recorded within the project areas that would indicate the presence of any areas or features of regional, national or international importance. Cultural heritage features of local importance may, however, be present. These will include gravesites usually close to houses and areas of Sacred Forest that exist between Edéa and Kribi. Gravesites tend to be close to houses and therefore, where properties are affected, the potential exists for graves in the vicinity. On the power plant site, at least 2 graves are visible and will be affected.

The archaeological evaluation carried out on the surface areas of the future Mpolongwe gas fired power plants confirmed once more the existence of archaeological sites including a diverse human settlement. The results of this brief visit can neither be considered as those of a large-scale impact study nor can it be adequate enough in the execution of an action plan. Additional prospection is needed to gather real knowledge on the archaeological riches before the construction.

The works supervision is very crucial in future actions on preventive archaeology. This is applicable mainly to construction works involving the excavation of significant amounts of earth. It must obligatorily be incorporated into the company's action plan on the management of cultural heritage.

In the Kribi region there are two officially protected areas, being the Douala – Edea wildlife reserve and the Campo-Ma'an National Park.

The Douala – Edea wildlife reserve is located in the Littoral province, department of the river Sanaga. The wildlife reserve covers a surface area of about 1,600 km² and is made up of two uneven parts. The larger part, in the south, is located between the mouths of the river Sanaga in the north and the Nyong river in the south; the other, smaller part stretches along the northern coast of the river Sanaga to the point of Souelaba and is limited in the east by the Kwa Kwa creek.

The Campo-Ma'an National Park is located in the south-western part of the Kribi region province and covers a surface area of 2,640 km². The Campo Ma'an National Park is an environmental compensation zone, as a result of the Chad-Cameroon pipeline. The World Bank, GEF, the European Union, SNV, GTZ, WWF and IUCN have financed projects in the area. The *Fonds pour l'Environnement et le Développement du Cameroun* (FEDEC) and the WWF are presently financing conservation projects in the National park.

4.8 SOCIO-ECONOMIC FRAMEWORK

Cameroon has a total surface area of 475,650 km² and a population estimated at 16 million in 2003 which gives a density of about 33 inhabitants per km² (National Institute of Statistics (NIS) estimations). The population has an average growth rate of 2.6% per annum. The life expectancy was estimated at 52 years in 1999 by the NIS. Cameroon has a youthful population with more than half of the population being below 25 years. The country has about 276 ethnic groups. There is a wide range of geographical diversity with three main ecological zones: the forest zone, the western highlands and Saharan zone.

When looking at the gender distribution in the project area both provinces have an equal sex distribution. In other words most households consist of 50% males and 50% females.

Table 1: Gender Distribution in project area

| Gender | Male (%) | Female (%) |
|--------------------|-----------------|-------------------|
| Edéa Sub Division | 50 | 50 |
| Kribi Sub Division | 49 | 51 |
| Both Sub Division | 49.4 | 50.6 |

However, when looking at the sex of the head of the household, this distribution changes significantly with the majority (81%) of the households being headed by a male. The ESD has a slightly higher percentage of female-headed households than the KSD. One possible reason for this is that the male heads of households are working in Douala and do not reside with the family. In case of female/child headed households, these should be given priority in receiving their compensation package and assistance in reallocation.

Table 2: Sex of head of household in the project area

| Sex of head of household | % Edéa Subdivision | % Kribi Subdivision |
|---------------------------------|---------------------------|----------------------------|
| Male | 80.2 | 82.5 |
| Female | 19.8 | 17.5 |
| Total | 100 | 100 |

Although of the country is based on agriculture, livestock, fishing, industry and services, agriculture has been, and is still, the key sector of the Cameroonian economy; it always accounts for about 30% of the GDP. However, agriculture still employs about 75% of the total population, generates about 25% of export earnings, and contributes to about 17% of state revenues according to the annual statistics published by the NIS.

The project area lies in two provinces: the Littoral Province (northern area) and the South Province (southern area). 82% of the Littoral Province population are urban dwellers; the majority of urban dwellers live in Douala. In the South Province only 28% live in urban areas, such as Kribi. In both areas the population is young with over 40% of the population being under 15 years.

The Littoral Province has a vibrant local economy with urban and rural markets being found throughout the Province. Douala is the main town and has the highest urban density in the Province. This is as a result of the potential employment opportunities and the concentration of good infrastructure such as the port, international airport, roads and railways. It also provides a hub of the export and import of products going to and coming from the other regions of Cameroon and neighbouring countries (Chad and The Central African Republic). The province has a large capacity for producing electricity through two hydroelectric plants located on the Sanaga River.

Kribi is the key town in the Project area in the South Province. Kribi town itself is a coastal tourist area with many hotels and guesthouses. Outside Kribi and Douala, land use is dominated by forest and land adjacent to villages is used for agriculture. Agriculture is therefore the predominant economic activity in the project area. It comprises occasional large-scale units using modern techniques that are dominated by foreign companies who produce rubber, palm oil, fruits and legumes, or traditional subsistence farming where the main crops are cassava, banana, and cocoa. Villagers also practise livestock production and some small-scale business activities.

The project area is characterised by moderate to severe poverty. Observations made during the household survey confirmed this status with over 50% of inhabitants living below the poverty line. The main sources of income in those villages were, in descending order of importance, agriculture (40%), informal sector (24%), formal sector (23%), hunting and fishing (7%), allowances from relatives (3%) and others (3%).

5. PROJECT ALTERNATIVES

5.1 PLANT ALTERNATIVES

An independent study for plant alternatives was undertaken by Power Planning Associates in 2005, which included an assessment of the alternatives for the location, plant types, and fuel. The conclusion was that the best alternative was to locate a natural gas-fired plant with simple cycle gas turbines within the Kribi area.

5.2 PLANT SITE

Following the initial decision that there would be a gas fired plant near Kribi, five sites were assessed as potential locations for the plant with respect to size, flatness, quality of soil, access roads, availability of fresh water, land use etc. It was concluded that the preferred site was Mpolongwe 1.

5.3 TRANSMISSION LINE

The route of the transmission line was also assessed. Deviations of the route were considered with reference to existing houses, plantations and farmland to ensure that the route selected minimised disruption.

Single and double circuit options were also considered. A double circuit option was chosen as, although more expensive than a single circuit, allows for security of supply and potential future expansion.

6. POTENTIAL IMPACTS AND MITIGATION MEASURES

6.1 AIR QUALITY

As there are no formal air quality monitoring stations within Cameroun, there were no readily available existing baseline data on the project area. A monitoring survey was therefore set up for the project (using diffusion tubes) to measure background levels of Nitrogen Dioxide (NO₂) and Sulphur Dioxide (SO₂), and O₃ (ozone).

Background concentrations of NO₂ and SO₂ are far below both World Bank and WHO guideline values, reflecting the very low level of current emissions of these pollutants in the area around the proposed site. Background levels of ozone are typical of equatorial latitudes. The photochemistry of the region is limited by low levels of NO₂ and as a result minor emissions of nitric oxide would be rapidly converted to nitrogen dioxide. Background levels for ozone were typical of equatorial regions. Overall, baseline air quality in the vicinity of the proposed plant site and transmission line route is good but with some possible deterioration within Edéa.

Table 3 : Background Pollutant Concentrations (µg/m³) (revised)

| Pollutant | Site 1: Mean Background Concentration (µg/m ³) | Site 2: Mean Background Concentration (µg/m ³) | Average (µg/m ³) |
|-----------------------|--|--|------------------------------|
| NO₂ | 1.2 | 0.8 | 1.0 |
| SO₂ | 1.4 | 1.5 | 1.5 |
| O₃ | 33.8 | 44.1 | 39.0 |

Note: This table has been updated to include monitoring results not available at the time of preparation of the original ESIA report.

Table 4: World Bank Air Quality Guideline Values

| | Reference Period | Recommended maximum ground level concentration values (µg/m ³) |
|-----------------|------------------|--|
| NO ₂ | 24 hour average | 150 |
| | Annual average | 100 |
| SO ₂ | 24 hour average | 150 |
| | Annual average | 80 |

Table 5: WHO Air Quality Guideline Values

| | Reference Period | Recommended maximum ground level concentration values (µg/m ³) |
|-----------------|------------------|--|
| NO ₂ | 1 hour average | 200 |
| | Annual average | 40 |
| SO ₂ | 24 hour average | 125 |
| | Annual average | 50 |

During the construction phase the potential impacts on air quality, for both the plant site and the transmission line are (i) dust generation from on-site activities, and (ii) vehicle exhaust

emissions. Dust generation has a nuisance value and may present a health risk. However these effects are easily mitigated and impacts were assessed as being adverse, but minor in significance and of short duration.

During the operational phase, the potential impact is associated with emissions from the power plant when being powered by either natural gas or diesel. The impacts were fully modelled using air dispersion software and were assessed as being adverse but of minor significance. In the case of diesel power, pollutant emissions will be higher than for gas however the impact will be very short term as the plant is to be fired by diesel only for a maximum of 8 continuous days per year. A variety of **mitigation** measures will be adopted to minimise dust generation. These are included in the Environmental Management Plan (EMP), which will ensure the measures are implemented in the operational phase.

6.2 SURFACE WATER

The only current impact on the streams is by local inhabitants who use them to wash clothes and for other domestic purposes. Streams are however the main water source for 65% of local residents. Even where groundwater is available, surface sources are preferred. Using surface water for drinking has been the most significant cause of sickness in the local population and demonstrates that streams are polluted. There is no existing monitoring system for either quality or quantity of surface water. However, monitoring will be conducted within the overall project development. As the potential impacts on water quality and water demand were assessed as minor, no baseline-monitoring programme was required for the ESIA. Key potential impacts on water resources are (i) contamination through soil erosion or spillage of potentially contaminative materials such as fuels, and (ii) altering the quantity of available water by over abstraction or changing run-off within the catchment.

Mitigation measures will be implemented to protect soil resources. These will prevent erosion and thereby protect surface water. Suitable sanitary systems will be provided for all site workers to prevent pollution of water resources and good practice implemented to ensure no spillage of oils, etc. The impact on surface water resources is therefore assessed as minor due to the low potential for pollution from either soil erosion. This potential impact will be during all phases of development for the power plant and construction and decommissioning works of the transmission line.

6.3 GROUNDWATER

As most of the project area is within rural setting, significant groundwater pollution from human activity is unlikely to have occurred. At the plant site and along much of the transmission line route, water supply for the local villages is primarily from surface water sources. Approximately 35% of the supplies to villages are from wells fitted with hand or foot pumps. Groundwater is therefore the predominant water supply for some villages, primarily being used for drinking water. No wells are present at or near to the plant site.

During construction, the project will require small amounts of water however this will be taken primarily from surface sources. As such groundwater will not be subject to any significant impact in terms of reduced quantities within existing wells. In the operational phase, it is intended to use groundwater for the supply of water for domestic and welfare purposes at the plant. Based on estimated staffing levels, the total daily amount of groundwater used will be approximately 2.25m³. Pump rates will therefore be very low (< 0.03l/s).

Mitigation measures for the construction phase will be temporary but will ensure the protection of groundwater. Latrines will be either pits or portable. Temporary bunding will be used around areas where oil tanks are stored. Other chemicals, such as greases and cleaning agents, will be stored in secure units to prevent theft or tampering. The floor of the unit will have a raised lip to contain minor spills.

Mitigation measures for the operational phase will include:

- Enclosing the diesel storage tank within a water-tight bund that has the capacity to store at least 110% of the total stored volume;
- All pipe work for fuel delivery and discharge above ground;
- Catch pits constructed below each unit of the transformer;
- Drains from the workshops will be fitted with oil separators; and
- All foul sewage will be directed through a septic tank for treatment prior to discharge via a soakaway.

Full maintenance and management for these systems will be included in the EMP. Overall; the impacts on groundwater are assessed as being adverse and insignificant or minor. Minor impacts will be long term during the operational phase for the plant area from potential pollution of groundwater at the Plant Site.

6.4 NOISE

There are no existing, significant noise sources in the vicinity of the proposed plant site or transmission line. The main potential source is the Kribi – Edéa road however this carries a low volume of traffic so the background noise level from this is minor. Potential noise impacts from the Kribi Power Plant will be from traffic and site activity during the construction phase and the small increase in traffic volumes, corona discharge (the noise generated by high voltage lines), and from the power transformers and gas turbines during the operational phase. Traffic noise for both phases is assessed as being insignificant. The noise generated by high voltage lines is affected by the actual voltage and climatic conditions. In wet conditions audible noise levels increase however overall impacts will be insignificant.

Mitigation measures for the construction phase include:

- Regular maintenance of plant and equipment;
- Cutting, grinding, etc will take place in an enclosed space;
- Noisy operations will be sited maximum distances from sensitive receptors;
- Controlling and limiting traffic movements around sites.

Without mitigation, noise levels at the plant in the operational phase would exceed current ambient noise levels and the World Health Organization (WHO) recommended levels. Mitigation measures have therefore been devised to protect local residents. These include construction of a noise bund (concrete block wall or similar), in close proximity to the turbines to attenuate noise at offsite receptors. Silencing systems will also be fitted to the top of the stacks to reduce noise generated at this elevated level. These are suitable measures for dealing with noise from the gas turbines and will reduce noise levels sufficiently to comply with WHO guidelines. Overall, when mitigation measures are implemented for the operational phase, the impact of noise generated by the plant is assessed as being adverse, long term but of minor significance. The noise from corona discharge has been assessed as having insignificant impact. All noise generated in the construction phase is short-term and of minor significance.

6.5 TRAFFIC

Potential traffic impacts from the power project include increased road congestion, noise, vibration & air quality, and increased safety risks. During the construction phase traffic will be generated from a series of activities including initial site clearing, construction of access roads, installation of plant and equipment, and construction of the transmission line. It is estimated that peak lorry movements will be up to 300 movements per day. These journeys will be associated with importing materials to and from site. Transport of staff in this period will generate up to 100 movements per day.

During the operational phase transporting staff will involve only 15 to 20 movements per day. The main product that will be delivered to the plant will be restricted to fuel. It is estimated that a maximum of 200 loads will be required over the course of a year. Overall, the traffic flow during the operational phase is very low and will have no significant impact on the environment. The project will cause no significant impact on the Douala – Edéa road. However, the Edéa – Kribi road will experience up to a 100% increase during the peak period and potential impacts will occur, e.g. risk of accidents. However, despite this high % increase (due to low current flows) overall traffic movements on this road will still be low in comparison to its potential design capacity.

Mitigation measures to deal with increased congestion are limited because there is only one access road available. Similarly, the materials and people to be transported cannot be reduced. During the construction phase, in particular, vehicles will operate at full capacity wherever practicable to minimize the number of movements. Special vehicle convoys will also be planned for off-peak periods, which will avoid increasing congestion during busy periods of the day. With reference to noise, vibration and air quality the main mitigation measures will include restricted traffic speed in sensitive areas (through villages) and regular maintenance of vehicles so they operate at optimum condition. The overall impacts of traffic from the Kribi Power Project are restricted to the construction phase and assessed as being adverse in nature, short term and minor in significance due to the increase in road traffic for this phase of work.

6.6 SOILS and LAND USE

The primary impacts on soils and land use are associated with the need for land take and vegetation clearance. The restriction of vegetation height to 2 m will not affect the main staple crops such as cassava and as such limited land use change would be required under these restrictions. These crops could therefore continue to be farmed, along with low shrub crops although tall tree crops would not be permitted. Burning within the wayleave is also not permitted.

The only agricultural land use that would be affected by the development (if farming were permitted) would therefore be tall crops, primarily being fruit trees, oil palms and bananas. Where these types of crop were originally identified they will not be allowed to be regrown during the operational phase. Impacts arise in both construction and operational phases and most changes will be permanent in nature. Secondary impacts may arise where soils are disturbed which may lead to erosion, and where soils are polluted by spills of fuels, etc. Good on-site management in the construction phase will assist in minimizing the amount of disruption to local land users. With regard to the operational phase, compensation for loss of land use will be negotiated. Another method of mitigation is to allow continuation of agriculture within the way leave on conditional terms and in compliance with strict vegetation management guidelines. However this would be at the risk of AES SONEL needing access to the line and for

maintenance for safety reasons. As land use capability within the project area is low, population density and therefore pressure on land resources is also low impacts on land use is therefore considered to be insignificant and long-term. Soil contamination may result from spillage of e.g. fuels.

Mitigation measures will be employed (as for those protecting groundwater) and the implementation of these will be covered in the EMP. In addition, waste management will be controlled by methods given in the EMP. Soil erosion will be controlled by a number of methods including keeping ground clearance to a minimum, controlling run-off, and re-planting areas once construction is finished. Overall with the implementation of these good working practices the impact on soils is assessed as being adverse, long term and either of minor significance or insignificant.

6.7 BIODIVERSITY

The Kribi Power Project will require land take for the construction sites and vegetation clearance and on-going management within the transmission line corridor. Potential impacts on the flora and fauna include:

- Loss of habitats from clearance for construction of the plant and line;
- Habitat severance due to way leave clearance;
- Potential for increased hunting, firewood and timber collection from new access routes; and
- Disturbance of wildlife and potential increase in road kills, etc. due to project construction and operation.

The proposed **mitigation** measures are therefore based on /

- minimising the area of land take,
- Utilising already disturbed areas (e.g. existing road and wayleave corridor),
- vegetation management (retention of vegetation in wayleave to 2 m height where practicable),
- Control of noise during construction and at the plant site during operation, and vehicle speeds.

Whilst the project will result in the loss and alteration of this habitat, and has the potential to cause disturbance to wildlife, the overall impact is low due to the relatively small area of land take, the low conservation status of the area affected and the current level of disturbance within this area. The impacts of the project for both the construction and operational phases are therefore assessed as being of adverse minor significance.

6.8 LANDSCAPE and VISUAL

The general landscape character is one of rolling hills with secondary forest vegetation comprising mature trees in excess of 30 m in height. This landscape is interspersed with human settlements, subsistence farming activity and a main road and power line infrastructure corridor. Clearance of vegetation along the wayleave of the proposed transmission line, construction of high voltage towers and clearance and construction of the power plant have been identified as the main impacts with potential to adversely affect the landscape. The primary factors are the new visual elements.

Mitigation measures were considered at the outset of the design process when consideration was given to operational factors as well as the environment. Therefore, the route of the transmission line was planned to follow the existing 90 kV power line and main road from Kribi to Edéa. Some deviation has been designed to ensure maximum separation from existing settlements, which will reduce visual intrusion. The plant site has been selected to provide good separation from existing properties.

Generally views from any property are limited by the forest and only short, intermittent views of the existing transmission line are visible. The project will not introduce a new visual element along the transmission line corridor but will simply add a similar element to that of the existing line. The power plant is a relatively small area set back from the road and surrounded by the forest vegetation. The visual impacts of this, although a new feature in the landscape, will be minimal due to the level and natural screening. Overall, the impacts for landscape and visual elements have therefore been assessed as adverse long term and minor.

7. SOCIAL IMPACT ASSESSMENT

7.1 POPULATION and DEMOGRAPHICS

Independent of the SIA and in line with Cameroonian legislation, a full property census was undertaken by the Compensation Commission established by the Kribi and Edéa Divisional Officers as specified by the Public Utility Decrees signed by the Minister of State Property and Land Tenure for the project (May to June 2006). Initial findings of the census indicate the following are within land take required by the project and will therefore need to be resettled:

On the plant site:

- 8 households, including crop owners;
- 17 crop owners;
- 2 graves; and
- 0 titled lands.

On the transmission line route:

- 86 households
- 665 crop owners
- 55 graves
- 34 Titled lands

Land take for the project will include tracts of agricultural land, which is mostly held by customary land tenure rather than legal title. As the livelihoods of the local population are mostly land-based, the power project may have a considerable effect on the community and their livelihoods. Land requisition along the corridor of the transmission line is potentially the most significant social impact on the local population and demographics. With requisition of land there are a number of potential impacts:

- Associated resettlement;
- Conflict with host populations; and
- Loss of cultural property.

In addition, the project will also potentially be affected by in-migration.

The key **mitigation** measure to minimise the impact of the project on the population is project design and the location of the plant and the transmission line in uninhabited areas. Five alternative plant sites were reviewed and the preferred site was chosen to minimise the need for

resettlement. The transmission line route was also selected to avoid settlements and cultural property as far as possible. In addition, the proposed line is located adjacent to the existing 90 kV power line. This has enabled the new line to share the existing wayleave where the two lines are parallel and therefore reduce direct land take.

Where resettlement is required, this will be mitigated by a Resettlement Action Plan (RAP) that has been developed in compliance with requirements of the Bank's Policy on Involuntary Resettlement. Resettlement will be completed before physical works begin on the plant or transmission line. With the implementation of the RAP the impact for land requisition and resettlement are assessed as adverse, long-term and minor. Should resettlement be to more productive land the impact will be beneficial.

Conflict with host populations will be minimised by the resettlement of households, wherever possible, within their existing villages. In line with Bank policy, mitigation measures also included consultation with communities and government, prompt payment of compensation or resettlement, arrangements for addressing any conflict between households being resettled and the host population, and measures necessary to augment services (e.g. water and power supply) to ensure host areas are comparable. With this mitigation, the impact of conflict has been assessed as long-term, but insignificant.

The construction phase of the project requires approximately 550 - 600 workers. The majority of these workers will be carrying out manual labour and therefore, where practicable will be sourced locally. However, there will be the requirement for specialist staff from other parts of Cameroon and potentially expatriate staff moving to the project area for the construction and operational phase; not more than 75 such people are expected. Contract workers should be sensitised and briefed on appropriate behaviour while working in the project area. Contract staff should also be made aware of the local culture and mores.

It is estimated that the operational phase will require approximately 60 staff to be employed at the Plant Site. Wherever possible, it is planned that the employees sourced during construction will be trained and retained for the operational phase.

Sustainability principles at authority and business level will be endorsed by elimination of discrimination for employment and occupation (for sex, race, and handicap) and transparent employee recruitment processes that are in favour of the local population.

Impacts may be STIs HIV/AIDs etc. Specific measures were proposed in the ESMP such as a HIV/AIDS campaign to the project-affected community and contract workers. Additionally, the local health centers will be involved in this measure, to ensure that local issues are taken into account and that local solutions can be developed. This short-term influx of over 500 people is assessed as adverse and significant.

7.2 ECONOMIC ENVIRONMENT

The project area lies within both the Littoral and South Provinces as follows:

- Power Plant and 65% of the southern section of the Transmission Line lie within the Kribi subdivision of the Ocean Division in the South Province; and
- The northern 35% of the line and connection with the SIG at the Mangombe substation at Edéa lies within the Edéa Subdivision in the Sanaga-Maritime Division in the Littoral Province.

The key negative impacts on the economic environment are the loss of land and compensation discrepancy through land right disputes. These tend to be short-term effects and can, with proper management, be adequately mitigated. However the project has potentially significant longer-

term positive impacts relating to increased national power supply and associated regional economic benefits plus local economic effects from both shorter term and long term increases in employment and trade.

To **mitigate** the adverse impacts the process for compensation will be provided within the RAP. Compensation will be undertaken with focus on providing full and appropriate redress for any economic loss suffered by the project affected people. Overall, the beneficial impacts on the economic environment are significant in the short and long term through the increase in national power supply, employment for the project and associated expenditure. These impacts will occur at both a regional and local level. However, loss of land and associated loss of revenue is a significant impact, but if properly managed this will be mitigated by the implementation of the RAP for the project.

7.3 SOCIAL SERVICES and INFRASTRUCTURE

There are a number of primary schools in the project area, although none are understood to be located within the land required for the project. Literacy in the project area is also high, which was supported by the findings of the household survey undertaken by SW. There are two health centres in the Kribi subdivision in the rural project area. There are also a number of government and private hospitals and health clinics in Kribi and Edéa. However, as very few people own or have access to cars, the roads are used mainly for walking or ‘hitching a ride’ to the larger towns, such as Kribi and Edéa. The roads are, however, regularly used by local buses that travel between Kribi and Edéa.

Surface water resources are the main water supply for local inhabitants for all domestic purposes. A number of households reported having suffered from water-borne diseases. Several child deaths were reported as a result of diarrhoea and other water-borne diseases. This would suggest that current water supply is not entirely safe for human use. All of the houses surveyed only have access to open pit toilets.

Mobile phones are the most common form of communication in the project area. None of the surveyed households had fixed landlines, but observations would suggest that a good proportion of households had access to mobile phones. The availability and use of electricity is very varied in the project area. A large number of villagers have access to electricity although not all the houses are connected to the electricity network.

According to the survey and site observations, the majority of villages have the capacity to access electricity. What is meant by capacity is that many households may have the technology to connect to pylons, but they may not have the money to pay electricity bills or the pylons have gone into disrepair and have ceased to be connected to a national grid. Some wealthier households may have their own generators thus making them independent of the local electricity infrastructure. The village of Dehane has no electricity capacity at all.

Key potential impacts on infrastructure from the Project will be pressure on existing health services and degradation of water supplies. With regard to health services, the construction phase is when there is potential to put considerable strain on the local medical services.

In **mitigation**, the Contractor will be required to provide additional basic medical services, such as an on-site health post. During the operational life of the project, staff numbers will be approximately 60 and all of these will live in towns where existing facilities can accommodate

their medical needs. Effective mitigation will also involve good sensitisation about sexually transmitted diseases and HIV/AIDS.

In addition, there may be more minor impacts on education, electricity and communication services. It is concluded that the potential for large numbers of school-age children moving into the area is low as the construction phase will be a short-term operation and the operational phase will only employ 60 people full-time. The impact on existing educational services will therefore be insignificant. The impact on communications will be neutral to positive.

There may be an indirect positive impact if the project generates income and more people are able to afford mobile phones. Similarly with electricity, increased local income generated by the project would mean that more people could be expected to afford to pay for electricity. However overall additional long-term employment is relatively low and therefore major increases in access to local services is unlikely.

7.4 ELECTROMAGNETIC FIELDS – COMMUNITY HEALTH

The ESIA deals with the potential issue of electro-magnetic fields (EMF) and their impact on community health. For the last twenty years it has been widely debated if these fields are damaging to human health. There is a range of divergent views, but the balance of scientific evidence to date suggests that Electromagnetic Fields (EMFs) do not cause disease. However, international organisations such as the International Commission on Non-Ionising Radiation Protection (ICNIRP) and independent states have set guidelines on exposure limits on EMFs to minimise the potential for shocks and interference with the body's nervous system.

Electromagnetic fields are produced both naturally and as a result of human activity. Wherever electricity is used there will also be electric and magnetic fields. The Kribi Power Project, through the operation of the proposed transmission line, will generate both electric and magnetic fields, which will show the highest ground level values straight beneath the line.

There are no specific, physical mitigation measures proposed to offset potential impacts from EMF effects. However, EMF levels will be within recognised international limits below or close to the line. In addition, the line will however be within a wayleave where no residential properties, or any built development, will be permitted. For the current design this will result in the nearest property no closer than 15 m to the line. Whilst no significant impacts are identified, this separation distance will act as a mitigation measure by further reducing the potential exposure levels of any long term occupied buildings. In addition to this, the potential fear of EMF impacts would be considered within the mitigation measures. Whilst a specific campaign of information on EMF effects is not recommended, staff involved in line planning, survey and construction would be instructed in the effects and therefore be in a position to answer questions or provide information should queries arise.

8. ENVIRONMENTAL HAZARD MANAGEMENT

Increased risk to road users is related to the increase in volume of traffic and the route the haulage takes. As noted above, limited options exist for altering either of these. Therefore the main mitigation measures to be implemented to reduce accident risk are as follows:

- control traffic speed through villages;
- provide driver training to ensure competence and provide operating procedures re routes, speeds, etc.;
- implement appropriate driver safety procedures including limiting hours of working, ensuring no alcohol or other substances are consumed prior to or during shifts;

- vehicles will be maintained to ensure breaks, lights and warning signals are fully functioning;
- design of the access road junction will ensure adequate visibility on to the main highway for vehicles leaving the site and suitable turn in lanes for access off the highway;
- signage to be erected on the main road leading up to site access and before each village to provide advanced warning to site traffic and other motorists;
- Consultation with villagers to inform them of the increased traffic and duration of works.

9. MONITORING PROGRAM

The full EMP provides a detailed monitoring programme, which is essential to ensure the project achieves its operating standards. Protocols will therefore be developed to control this monitoring. These will include the following:

- sampling methods;
- sampling location and frequency;
- equipment types and calibration;
- data recording and logging;
- routine audits.

Where off-site laboratories are to be used, these will be checked to ensure appropriate standards are achieved.

A summary of monitoring requirements for the project is listed below:

For Construction Phase:

- AES regular inspection and audits
- AES audits of maintenance record and visual inspection of plant
- Design checks and on site construction monitoring to design
- Monitor on site water use
- Monitor groundwater levels on site on a monthly basis
- Review complaints re noise via SMP liaison system
- AES regular review of compliance of operations
- Daily inspection of oil bunds and separator
- Quarterly noise monitoring at sensitive sites for first year and if complaints received.

For Operational phase

- AES regular inspection and audits
- Continuous in stack monitoring for air emissions
- Design check and construction monitoring to design
- Monitor on site water use
- Daily inspection of oil bunds and separator
- Quarterly groundwater sampling and microbiological testing
- Quarterly noise monitoring at sensitive sites for first year and if complaints received.

For Decommissioning

- Design checks and on site construction monitoring to design
- AES regular inspection and audits
- AES regular review of compliance of operations

- Daily inspection of oil bunds and separator.

10. SOCIAL MANAGEMENT PLAN

In line with international practice a framework Social Management Plan (SMP) is presented within the ESIA. This framework document includes an outline of the monitoring and management required for the smooth running of the project. The elements of the SMP include:

- Social Policy;
- Project Review;
- Social Standards and Quality Objectives;
- Register of Social Impacts; and
- Mitigation and Implementation.

A detailed SMP has been drawn up and is discussed in the RAP Executive Summary.

11. PUBLIC CONSULTATIONS

Consultation has been an integral and on-going part of the ESIA process for the Kribi Power Project. This commenced in January 2006, with informal consultation taking place during the initial scoping visit by the Scott Wilson ESIA Team and continued during subsequent visits in February and March 2006. Ongoing consultation has continued throughout the preparation of the ESIA report and will continue throughout the project life from initial construction, through operation to decommissioning. Consultation of a range of stakeholders has been conducted both formally and informally.

For stakeholder identification the following methods have been used:

- Formal and informal public consultation meetings;
- Document and literature review;
- Household surveys; and
- Informal unscheduled discussions.

Generally, the consultation process has been well received by the affected communities. However, in order to maintain this goodwill the distribution of non-technical project summaries and maps to the affected people needs to be done. Furthermore plans need to be made for the required public audience in conformity with article 13(1) of the Decree no 2005/0577/PM. This will entail the distribution of the executive summary of the ESIA report in French and English in public reading rooms throughout the project area.

Consultation with the affected population and with officials of local government, civil society organisations and other representatives of the affected population is both effective and meaningful. The project sponsor ensures that the process of public consultation is accessible to all potentially affected parties, from national to local level. Emphasis is placed on the engagement of local stakeholders, namely people who are likely to experience the day-to-day impacts of a proposed project. On a practical level, the sponsor has ensured that:

- All stakeholders have access to project information;
- The information provided can be understood;
- The locations for consultation are accessible to all who want to attend;
- Measures are put in place, which ensure that vulnerable or minority groups are consulted.

- Managing Distrust with consultation.

In addition, the project would be particularly sensitive to some of the feelings of mistrust amongst local communities. This will involve choosing village representatives carefully and constantly reviewing the consultation strategy. One approach could be to rotate the group of village representative so that there is a good representation of people, including women and those of a lower economic status. These types of measures will help to mitigate the perception that it is only those with power who will be consulted and therefore compensated. The consultation sought to expand on the socio-economic baseline data gathered and comprised of four tasks and a gender and intergenerational consultation framework that was culturally appropriate to the Bakola.

11.1 Benefits of the Transmission Line to the locality

Female Bakola thought they would benefit from being able to set up hairdressing and tailoring micro enterprises. Electricity was perceived to be the main benefit by both communities (Bakola and Bantou) but for very different reasons.

The Bakola women, who currently sleep outside, in particular want electric light, as they believe it will keep the snakes away. Preferred items for the women were shoes and cooking utensils. Women want their children to go to school yet also want them to retain their cultural distinction. They feel that without education they will remain isolated from Cameroonian society; with it they will not be perceived as primitive, by their neighbours. There was a divided opinion on whether Bakola children should go to the state schools or be educated within their villages to ensure they retained their culture. The men want their children educated in Bakola (their language) and French.

Women want to be able to process food crops such as palm nuts for oil. All wanted support in micro enterprise development. Women believed that material goods as basic cooking utensils, beds to sleep on, clothes and shoes for their families would be beneficial.

Health provision, education and access to potable water were often linked, especially by the women, who, through in depth discussions, wanted to combine health and education for them selves. This would enable them to understand non-traditional cures and thus be able to take responsibility for primary health care within their villages.

11.2 Impacts and measures to address negative issues

Relations with the 'neighbours' dominated discussions in every Bakola village with the men and were a major concern with the women and youth. No trust exists between these two communities. Networks of obligation were very much one-way. The result of this key issue is that the Bakola feel vulnerable and insecure.

Bantou women governed access to potable water. Bakola women were only permitted access to Borehole water (Elogbatindi) in return for cleaning the area; otherwise they depended on stream water. They accused the Bantou of deliberately polluting the stream water.

Bakola men and women perceive that rights and respect from their neighbours will come from formalising their identity as Cameroonians, i.e. Identity cards and legal tenure of the land and forest they live on, farm and hunt in, together with their sacred spaces.

Several villagers said they were concerned that young women would not want to marry local men as the young men could not compete with the wages of the contract workers. However, there were also villagers who welcomed the prospect of their children finding husbands and wives as a result of the project.

The key mitigation measure will be to minimise in-migration through the employment of people from the local communities, wherever appropriate and practical. Contract workers should be sensitised and briefed on appropriate behaviour while working in the project area. Contract staff should also be made aware of the local culture and mores. Local communities and contract workers should be given information on safe sex practices. This should be done in consultation with the local health centres and in line with their safe sex campaigns. The project planners should plan the arrival of contract workers so as to mitigate the impact of a large inflow of people.

12. CONCLUSIONS

The conclusion of the study was that a gas-fired power plant located at Kribi with natural gas supplied from Sanaga Sud was the least costly option with the least impact on the community's livelihoods.

13. REFERENCES AND CONTACTS

The documents reviewed by the African Development Bank include:

- the Environmental and Social Impact Assessment drafted by Scott Wilson Consultants in October 2006
- Kribi power plant community and indigenous people's plan, 2007
- Archeological potential kribi plant, November, 2007
- Kribi Resettlement Action Plan, December 2007

The summary of the Resettlement Action Plan is posted on the AfDB website along with the summary of the ESIA.

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