Abridged Copy of the Final Report on Environmental, Social & Health Impact Assessment *of*

Banner Energy 500MW Combined Cycle Power Plant and LPG Storage Depot

Presented to Federal Ministry of Environment (FMENV)

November, 2017

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Background Information

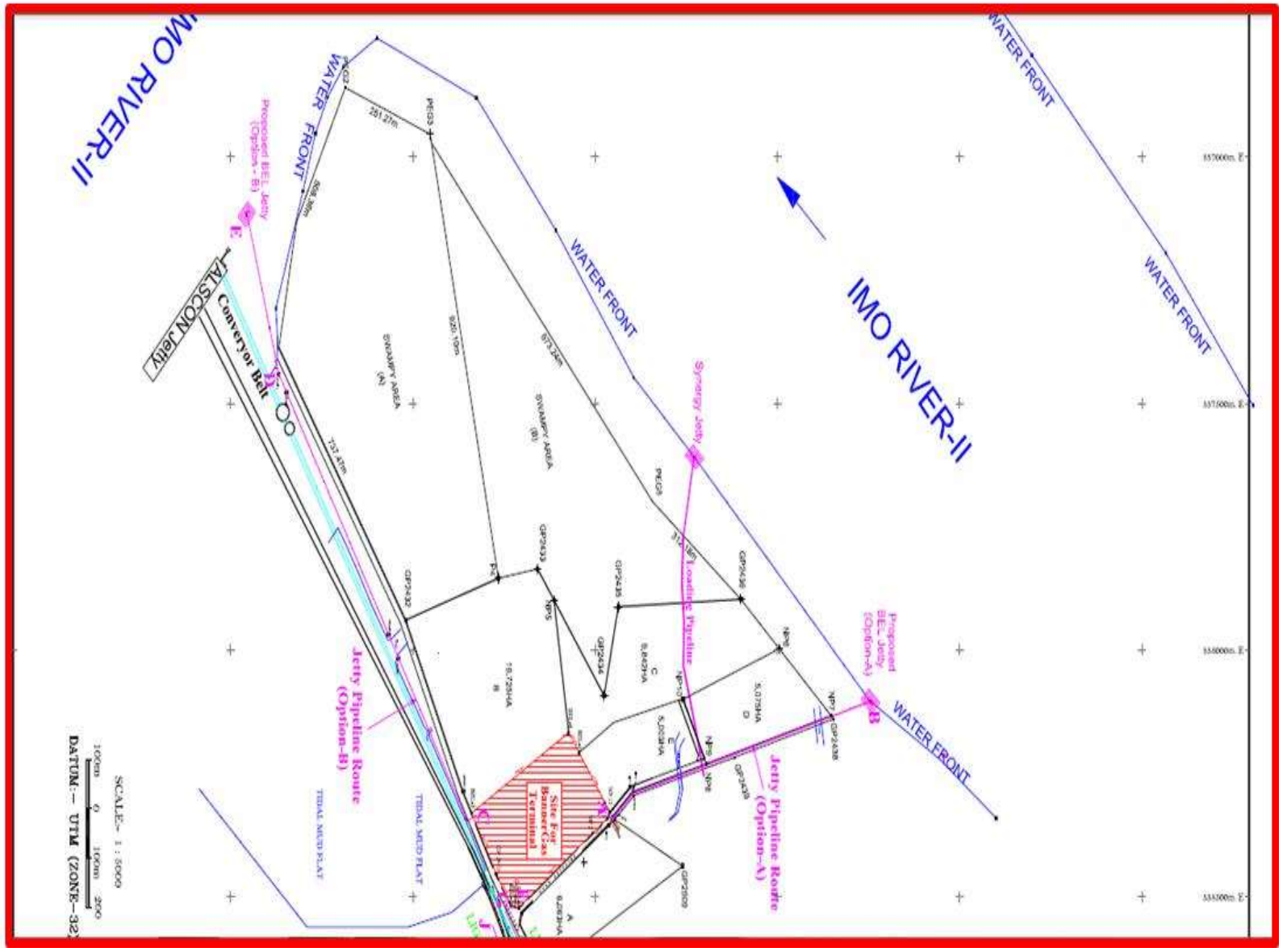
- **Banner Energy Limited (BEL)**, a limited liability company incorporated under the laws of Nigeria engaged in supplying products and services to the Power and Energy sector, intends to promote the development of an independent power plant (IPP) project with an installed capacity of 500MW in two phases. A 300MW (ISO) in the first phase and 200MW in second phase respectively.

- Banner Energy Limited will own and operate the proposed power plant project. BEL will also establish a Liquefied Petroleum Gas (LPG) Depot within the ten hectares land area that has been acquired at Ikpetim in Ikot Abasi Local Government Area of Akwa Ibom State.

- Banner Energy Limited commissioned **SEFAL Engineering and Energy Services Limited** to carry out the Environmental, Social and Health Impact Assessment studies in accordance with the Nigerian regulatory requirements and World Bank standard.

Banner Energy Power Plant Project location

- The proposed project would be located in Ikpetim community of Ikot-Abasi Local Government Area in Akwa Ibom State of Nigeria.
- **Figure 1.1** illustrates the location of the proposed project site in Ikpetim with its proximity to Imo River.



DPR/FME Approval/Support required:

- Approval of the EIA report to enable Banner Energy commence the project.
- Complement the effort to meet Nigeria Energy demand.

BIOPHYSICAL PRESENTATION

Objectives of the Study and Literature Review

Objectives of the EIA Study

- To establish the baseline conditions of the project area with respect to the biophysical, social and health environment.
- To identify and evaluate the potential impacts of the project activities on the biophysical environment of the area.
- To identify and assess the potential socio-economic effects of the project on the communities' livelihood patterns, including impacts on cultural properties, social infrastructures, natural resources and values.
- To identify and evaluate health impacts that may be associated with different activities of the project.
- To identify and enhance positive impacts arising from the development of the proposed project.
- To develop cost-effective mitigation measures and appropriate Environmental and Social Management Plan (ESMP) for sustainable development.
- To provide necessary input to the project technical team to ensure an optimised design that reduces as far as practicable environmental and socio-economic impacts.
- To interact with stakeholders and incorporate stakeholders feedback throughout the ESHIA process.

Study Approach/ Literature Review

- Carry out desktop study to establish the environmental (ecological, socio-economic/health, etc.) baseline characteristics of Banner Energy 500MW Combined Cycle Power Plant and LPG Storage Depot

- Review of policies, legal and administrative framework relevant to the study. As a minimum, the ESHIA was guided by the requirements of the FMEnv, International guidelines and conventions, BANNER ENERGY's risk management policy and industry best management practices

- Description of the scope and extent of the project operations, decommissioning/abandonment

- A one season field data (Biophysical) gathering (21-24 October, 2015) as approved by FMEnv (Appendix 4.1b) for Banner Energy 500MW CCPP and LPG storage depot project area, was carried out to obtain prevailing data which was used in describing the baseline condition of the environment. This was complemented with varied sources including secondary data resources from Ikot Abasi Power Plant Limited Final EIA Report, 2012 for the dry season data of the project area.

- Socio-economic & Health Impact Assessment within the project catchment areas

- Laboratory analysis of biophysical samples collected in line with the requirements of FMEnv and other relevant guidelines and standards.

Study Approach/ Literature Review

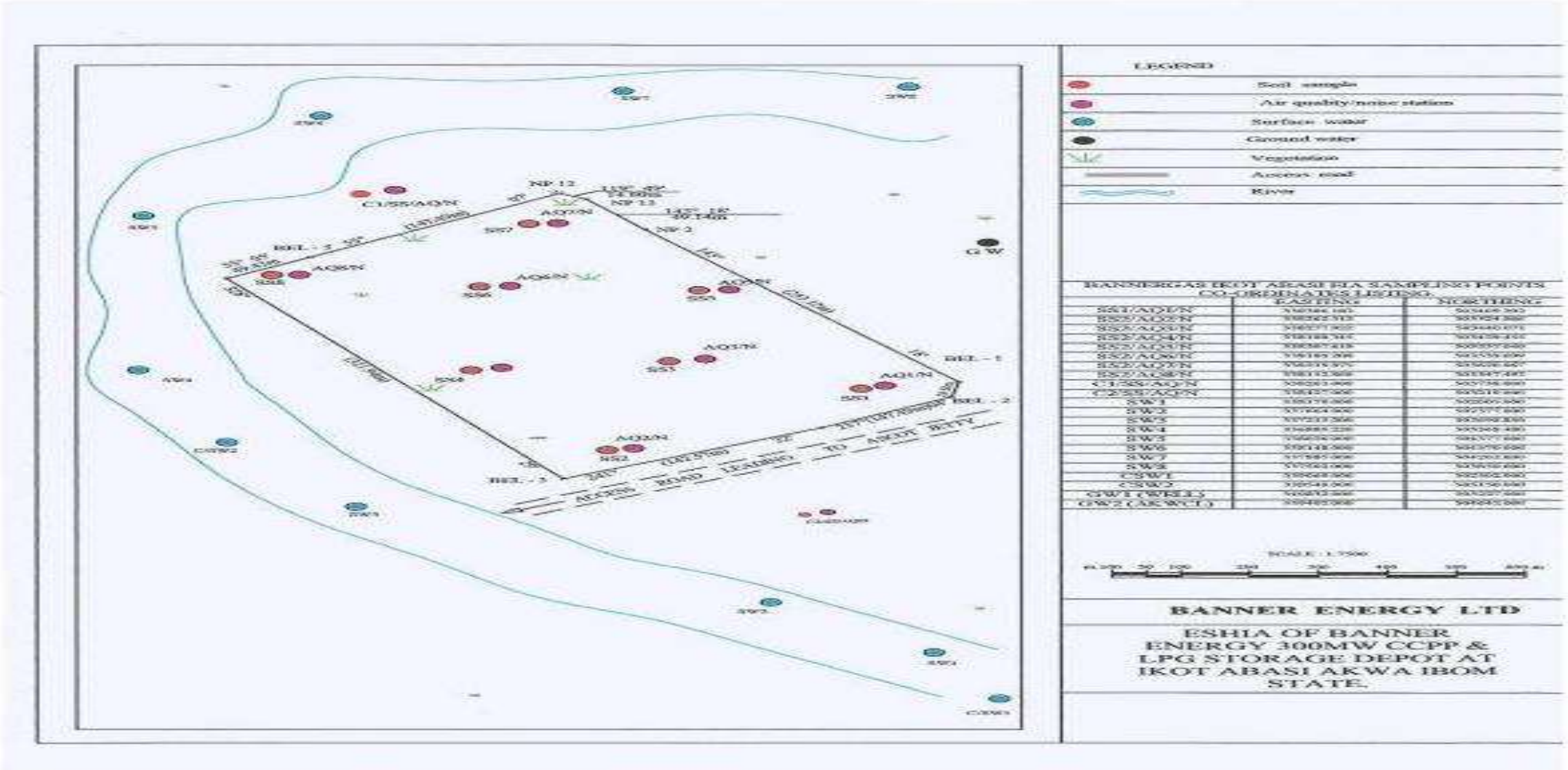
- Identification and assessment of associated and potential environmental impacts of the planned BANNER ENERGY power plant project
- Consultation with stakeholders relevant communities and agencies as applicable
- Prediction and evaluation of potential and associated impacts of the project.
- Recommendations to appropriately mitigate or avoid the identified adverse impacts and steps to minimize those impacts, which cannot be mitigated/avoided while enhancing beneficial impacts.
- Continuous consultation/Liaison with Regulators (FMEnv, DPR & AKSMEnv).
- Draw up an environmental and social management plan (ESMP); and
- Preparation / production of ESHIA reports that are in line with regulatory standards

Sample Quantity

S/N	Biophysical	Number of Sampling Stations
1	Surface Water	8 stations + 2 control points
2	Sediment	8 stations + 2 control points
4	Benthos	10 stations
5	Phyto & Zooplanktons	10 stations
6	Air Quality & Noise	8 stations + 2 control points
7	Soil	8 stations + 2 control points
8	Ground Water	2 stations + 1 control point

Sampling Methodology and QA/QC Measures

Sampling Map for Biophysical



Sampling Methodology

- Samples were collected in line with regulatory standards.
- On collection, samples were properly tagged with labels showing the name/location of sampling site, date/time of sampling, sample name, number and time, sampling personnel and preservative added.

- In-situ measurement of unstable physico-chemical parameters were carried out using different insitu measurement equipment's.

Environmental Aspect	Method of Samples Collection
Air Quality & Noise	Suspended particulate matter (SPM), CO_x, SO_x, NO_x, NH_3, H_2S, HC, and noise were measured with in-situ electronic meters specific to the parameters.
Water	Water samples for physico-chemical and microbiological analyses were obtained using water sampler and stored in ice packed coolers prior to analyses. In-situ measurements were also carried-out for fast-changing parameters including temperature, pH, dissolved oxygen, salinity, conductivity, turbidity and Total Dissolved Solid.

Sampling Methodology

Environmental Aspect	Method of Samples Collection
Sediment	Bottom sediments were sampled using the Eckman Grab (0.0225 m^2). These samples were obtained from bank-root biotype and from the bottom sediments. The content of the grab was emptied into a bucket and sub-sampled for physico-chemical and hydrocarbon analyses.
Benthos	Samples for macrobenthic fauna, were sieved through a 0.5mm mesh and transferred into 500ml wide-mouth plastic containers. The samples were immediately preserved with 5% formaldehyde-water mixture. The grab sampler was washed thoroughly (with river water) to remove adhering particles from previous sampling prior to collection of a new sample.
Phytoplankton	Phytoplankton samples were collected using the direct method with a 1 litre open mouth plastic container and fixed appropriately using 5% formaldehyde-water mixture from all the surface water stations.
Zooplankton	Samples of zooplankton were collected by sieving 50 litres of water through 45um plankton net and the filtrate poured into a plastic container and fixed immediately with a 5% formaldehyde-water mixture. Zooplankton samples were collected from the same stations as the surface water.

Sampling Methodology

Environmental Aspect	Method of Samples Collection
Soil	A hand-held Dutch type Soil Auger was used to collect representative soil sample. At each sampling station, composite soil samples were collected, bulked and thoroughly mixed for homogenization in a plastic bag. Soil samples for physical and nutrient elements analysis were sub sampled into polyethylene bags. Soil samples for microbial characteristics were sub sampled into sterilized bottles, while samples for hydrocarbon contents were collected into aluminium foils, wrapped up and labeled appropriately. Physical attributes of the sampled soils such as colour and structure were noted using the Munsell Soil Colour Chart with reference to the combination in the Munsell system of time, values and hue and documented in the field note book.
Vegetation/Wildlife	Eight transects were determined in the study area. The vegetation physiognomy and structural stratification were assessed visually at each sampling location in the study area.

Quality Assurance and Quality Control

Quality Control (QC)/Quality Assurance (QA) programmes covered all aspects of the study, including sample collection, handling, laboratory analyses, coding, storage, data analyses and report.

The quality assurance programme employed in the fieldwork and laboratory analyses were in accordance with the recommendations by DPR (1991 and 2002) and FEPA (1991).

Some QA/QC Procedures Employed

- ✓ Use of trained & experienced personnel
- ✓ Calibration of equipment
- ✓ Standard laboratory quality control procedures were adhered to for all analyses
  - determination of reagent blanks
  - use of fresh standards and replicate analysis for confidence limit
  - cleaning of glass wares and other containers.
- ✓ Blank and duplicate analysis (Elimination of analytical errors).
- ✓ Use of proper sample containers
- ✓ Proper labelling
- ✓ Insitu analysis
- ✓ Proper preservation- Formalin, Conc. Nitric acid, ice block etc.

Summary of Results/Findings

Climate and Meteorology

- The project area is within the humid tropical zone of the Niger-Delta with defined dry (November – March) and wet (April – October) seasons. The wet season is brought about by the South – West trade wind blowing across the Atlantic Ocean. The dry, dusty and often cold North – East trade winds blowing across the Sahara desert dominates the dry season.
- Rainfall in the study area as monitored from the nearest meteorological centre of the Nigerian Meteorological Agency (NIMET) from 1991 to 2005, shows that the wet season exhibits heavier rains with the highest occurring in July (365.7 mm) and less intense rainfall occur during the dry season months, December to February (19.8mm – 50.1mm). The mean monthly rainfall ranges between 19.8mm and 365.7mm.
- The field data indicate that relative humidity of the study area during the rainy season ranged from 82.3 – 89.0% while similar data was recorded for dry season (Ikot-Abasi Power Plant Limited – Draft EIA Report, 2012).
- The predominant wind direction in the area is North-Westerly but also including North-Easterly; and this usually prevails for 8 months. Atmospheric pollutant is expected to disperse mainly in the north westerly directions. Generally, the maximum wind speed recorded during the study was 0.7m/s for rainy season. The result is within the range recorded from similar projects in Niger Delta.
- The daily atmospheric temperature of the study area ranged from 28.7 – 31.5^{o}C for rainy season as at the time of survey. The annual mean of daily maximum air temperature in the area is lowest during the peak of the rainy season (June – October) and temperature in the area is usually at its peak during the dry season months of December – February.

Air Quality

✓ Air quality measurements recorded in the study area indicated that the ambient air of the area is free from detectable levels of air pollutants.

✓ Noise levels recorded were also well below the FMENV, DPR and WHO limits of exposure.

S/N	SAMPLING POINT/CODE	DATE/TIME	H_2S ppm	CO ppm	NO_2 ppm	CH_4 ppm	SO_2 ppm	NH_3 ppm	VOC ppm	SPM Ppm	Noise d(B)
1.	BEL AQ 1	22/10/15 1358Hrs	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	20.0	43.50
2.	BEL AQ 2	22/10/15 1422Hrs	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	20.0	40.30
3.	BEL AQ 3	22/10/15 1450Hrs	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	10.0	39.30
4.	BEL AQ 4	22/10/15 1505Hrs	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	8.0	37.30
5.	BEL AQ 5	22/10/15 1537Hrs	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	8.0	42.10
6.	BEL AQ Control 1	22/10/15 1554Hrs	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	3.0	42.30
7.	BEL AQ 6	23/10/15 09261Hrs	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	3.0	42.00
8.	BEL AQ 7	23/10/15 0949Hrs	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	5.0	41.00
9.	BEL AQ 8	23/10/15 1008Hrs	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	6.0	42.50
10.	BEL AQ Control 2	23/10/15 1112Hrs	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	5.0	39.00

Vegetation/Wildlife

Vegetation

The vegetation types of the Banner Energy Power Plant Project area ranged from freshwater swamp forest, rain forest, derived secondary forest and farmlands. There is also occurrence of pockets of rain fed fresh water forest/swamps in the surrounded area. The component species of the vegetation in the study area is shown in **Table 4.7**.

The site is within the Southern state with vegetation type as that of perturbed tropical rainforest undergoing gradual secondary regrowth. The forest is chiefly dominated with *Rhizophora* sp, Nypa palm, *Elaeis guineensis* (oil palm), *Alchornea cordifolia* (Christmas bush); but still had trees and shrubs.

Wildlife

Wildlife study of the area was carried out by standard methods including extensive literature review, listening to calls and vocalisations, direct sightings and spur marks. Interviews with local hunters provided another source of vital information on the wildlife of the study area. The faunal groups in the area are presented in table 4.26 of chapter four (4) of this ESHIA report. Insects were predominant. The mammalian, avian and herpetofaunal species of the southern region were represented in the study area. Directly or indirectly the project will have impacts on some in respect of their reproductive and population dynamics.

Soil Characteristics

The soils of the project area varied in colour (moist soils – using the Munsell Soil Colour Chart) from brown superficial (7.5YR 5/3) to light brown (7.5 6/3) at the subsurface level.

The darker shade of brown coloration of the surface soil is attributable to decomposition of dead organic material.

The textural feature is Loamy Sand to Sandy Loam from the surface to subsurface soil levels.

The sand fraction ranged from 82.08 to 87.88% at the surface soil level and from 80.08 to 89.72% at the subsurface soil level, silt fraction ranged from 1.28 to 5.24% at the surface soil level and from 1.44 to 4.94% at the subsurface soil level.

The clay fraction ranged from 7.40 to 13.16% at the surface soil level and from 9.60 to 15.16% at the subsurface soil level.

The soil reactions of the project area were acidic. The values ranged from 5.04 to 6.25 at the surface soil level and from 3.89 to 6.34 at the sub surface soil level. The values of electrical conductivity of soils of the project area ranged from 3.67 to 16.95 µS/cm at the surface soil level and from 3.15 to 240.70 µS/cm at the subsurface soil level. These values are considered low as electrical conductivity tolerance level for plants growing on soils have been set at 4000 µS/cm (400mmho/cm) in the saturated soil extract (Tel 1986).

The organic carbon (OC) content of the soils of the proposed Banner Energy power plant project area ranged from 0.874 to 3.575 % and from 0.747 to 3.255 % at the surface and subsurface soil levels respectively.

Soil Characteristics Cont'd

The Total Nitrate and Sulphate content of the soil of the project area ranged from 0.2 to 0.9mg/kg and 2 to 18 mg/kg at the surface soil level, and from <0.1 to 0.5 mg/kg and 1 to 6 mg/kg at the subsurface soil level respectively.

The heavy metals of the Banner Energy project area analyzed included Iron, Lead, Nickel, Zinc, Copper, and Vanadium. Concentration of Iron ranged from 535.7 to 2530.3 mg/kg at the surface soil level, and from 400.6 to 2437.1 mg/kg at the subsurface soil level. Lead concentration ranged from <0.001 to 2.03 mg/kg at the surface soil level and from <0.001 to 1.24 mg/kg at the subsurface soil level. Copper concentration ranged from <0.001 to 2.38 mg/kg at the surface soil level and from <0.001 to 1.36 mg/kg at the subsurface soil level. Nickel concentration ranged from0.11 to 2.15 mg/kg at the surface soil level and from <0.001 to 3.08 mg/kg at the subsurface soil level. Vanadium concentration ranged from <0.001 to 0.14 mg/kg at the surface soil level and from <0.001 to 0.21 mg/kg at the subsurface soil level. Zinc concentration ranged from 0.31 to 12.34 mg/kg at the surface soil level and from 0.04 to 9.49 mg/kg at the subsurface soil level

The hydrocarbon content of the soil of the proposed project area ranged from 1.60 to 4.10 mg/kg at the surface soil level and also 0.90 to 15.20 mg/kg at the subsurface soil level while the phenol concentration in the soil of the proposed project area was below the detectable limit of the analytical equipment used.

Soil Microbiology

Soil samples had low counts of petroleum degrading bacteria and fungi in all samples and <1% petroleum bacterial degraders indicated no contamination by crude petroleum and absence of stressed conditions. Densities of total heterotrophic bacteria and fungi ranged from 2.9 to $7.0x10^{6}$cfu g^{-1} and 1.4 to $5.0x10^{5}$cfu g^{-1} surface soil, 1.8 to $5.8x10^{6}$cfu g^{-1} and 1.2 to $2.7x10^{5}$cfu g^{-1} subsurface soil respectively. Counts of heterotrophic bacteria and fungi were generally high in all soil samples, which suggested normal microbial growth and absence of stressed conditions. Microbial populations of soil samples are shown in Table 4.19a - c.

Water Quality

Sediment Quality

The pH of sediment of the study area ranged between 3.43 and 4.55 during the wet season, while the range of between 4.87 and 6.74 was obtained during the dry season. The result reflects an acidic medium. This indicates that the sediments are slightly more acidic during the wet season.

In the wet season, hydrocarbon concentrations ranges from 1.90 to 20.40mg/kg. This is higher than the dry season concentration (1.10 to 4.14mg/kg).

The concentrations recorded for Iron, Zinc, Lead, Copper, Nickel and Vanadium range from 1595.19mg/kg to 2879.99mg/kg, 6.57mg/kg to 16.50mg/kg, 0.51mg/kg to 2.57mg/kg, <0.001mg/kg to 2.98mg/kg, 0.49mg/kg to 4.43mg/kg and 0.033mg/kg to 0.295mg/kg respectively for wet season.

Results for dry season range from 198.75mg/kg to 283.71mg/kg, 30.43mg/kg to 64.36mg/kg, 1.00mg/kg to 3.59mg/kg, 1.86mg/kg to 7.83mg/kg and 0.95mg/kg to 1.97mg/kg respectively (Ikot Abasi Power Plant Limited – Draft EIA Report, 2012).

Sediment Microbiology

Densities of total heterotrophic bacteria ranged from 7.5 to 15 x 10^{6}cfu g^{-1} sediments and densities of total heterotrophic fungi ranged from 1.8 to 32 x 10^{5}cfu g-1 sediments. Results of the microbial counts of sediments showed that population of heterotrophic bacteria and fungi were generally high in all the samples, which indicated normal microbial growth and activities in the sediment of the study area. Heterotrophic microorganisms such as bacteria and fungi in natural environments bring about decomposition of organic materials.

Planktons

- **Phytoplankton**

The results of phytoplankton community shows a total of 26 taxa belonging to 5 classes of micro-flora were recorded. The class Bacilariophyceae predominated the algal communities both numerical count of organisms as well as in species composition. The algal community for Bacillariophyceae ranked highest with 741 plankton organisms (50.0%) of the total harvest in the area. Cyanophyceae was second with 430 cells (28.8%), Euglenophyceae contributed 167(11.2%). Chlorophyceae and Dinophyceae contributed minimal of 102 (6.8%) and least 56 organisms (3.8%). Table 4.20 and Fig.4 contains the details. The phytoplankton population was observed to record low abundance generally as compared to other similar environment in Niger Delta.

- **Zooplankton**

10 species of zooplankton from 3 major taxonomic groups (Cladocera, Decapoda and Rotaria were encountered during the wet season study. Cladoara were dominant in terms of number of organisms and contributed about 148 individuals (46.5%) of the total zooplankton harvested during the period. Rotaria contributed 130 organisms amounting to 40.9% while decapod was the lowest on the table with 40 organisms (12.6%) the details is contained in Figure 6. Zooplankton species distributions were more consistent along the control stations than the main sampling stations. *Alonellia* was the only specie that occurred in all the sample stations, other species were not regular. The species richness showed more homogeneous along the control stations than the main sampling stations. The result showed values range between 4 species to 8 species along the station while the control stations had 10 species each.

Generally low densities of zooplankton abundance were recorded with minimum of 12 organisms (3.8%) in station 5 and maximum of 75 organisms (23.6%) in control station 2.

Benthic Macrofauna

A total of a genera belonging to six families were recorded. These were *Capitellacapitata, Notomastuslatericeus, Notomastus tenuis (capitellidae), Neriespelagica, Nereis virens (Nereidae), Nephthys hombergi (Nephthyidae), Ogyrides sp. (ogyridae), Tympanotonus fuscatus (Potamididae), and Thais califera (muricidae).*

Table 4.22 shows that Nereisvirens was the only specie that was found in a station, ogyrides was present in two stations all the other occurring species were found in 3 stations. The six families that make up the species composition were polychaeta (6 species), crustacean (1 specie) and Gastropoda (2 species). The 3 major taxonomic groups were dorminated by Polycnaeta with total number of 27 organisms (61.4%), crustacean had 3 organisms (6.8%), and Gastropoda, 14 specimens (31.8%).

SOCIAL BASELINE DESCRIPTION

Social Data Gathering

- A major component of the Socio-economics involves consultations with stakeholders in the communities within the project area. The consultation process mainly involves interviews and discussions with stakeholders in the communities(elders, leaders, women and youth groups)

The following tools were deployed:

- Focus Group Discussions/Key Informant Interview
- Administration of Questionnaires

Secondary data:

- Visit of government agencies / parastatals by SHIA consultants
- National Population Commission
- Bureau of Statistics
- Akwa Ibom State Hospital Management Board
- Akwa Ibom State Education Board, etc

Social Profile

- Areas covered in the study include population distribution and demographic conditions in the communities, social characteristics including ethnic composition and marital status of the population, adult literacy rate, school enrolment and education attainment

- Others are the local economy, resource harvesting, involving examination of natural resource endowments of the communities and their exploitation for sustenance, livelihood activities and income levels

- Quality of life covering housing conditions and infrastructural frame work in the communities were also studied

- In the same vein, the study examined socio-cultural resources, political and traditional administrative institutions, migration pattern, social vices, and security and conflict situations in the communities

- Other issues were perceptions and concerns of residents of the communities about potential impacts of the proposed project and also their expectations from the project.

Consultations

Taking into consideration the cosmopolitan nature of the project area, a wide range of consultations were carried out in order to ensure adequate representations. Specifically, those consulted were classified into three strata namely – public, institutional and private individuals. Public consultation was conducted in government establishments such as hospital, water board, security agencies, schools and those communities to be affected by the proposed power plant project. Institutions consulted included Ikpa Ibekwe Traditional Ruler's Council, Youth and Women Organizations while individual belonging to different social and/ or economic groups were also consulted, all in cooperation of the regulators (representatives of the Federal and State Ministries of Environment) and Banner Energy Limited as the project proponent.

Plate.15: Consultation at the Palace of Village Head of Ikpetim, Eteidung Akpan Etokafia

Plate.16: Consultation at the Palace of the Clan Head, Ikpa Ibekwe, HRM Etebom Akpan A. Uwa

Summary of Findings

Microsoft Word Document

- The community is an ethnic Ibibio community and the residents communicate freely in Ibibio native language. English language is also spoken, but some residents are not fluent. Non indigenious residents include Opobos, Urhobos, Ijaws, Yorubas, Housas and Igbos. Traditional administration in the area is hierarchical with five tiers of administration: the Paramount Ruler, Clan Head, Village Head, Extended Family Head and the nuclear family Head. The Paramount Ruler heading the Local Government Council-of-Chiefs (Traditional Rulers Council) made up of the Clan and Village Heads.
- The Paramount Ruler who is appointed among the Clan Heads reports to the Local Government Authorities which is under the State Government. The Clan Head who is selected among the Village Heads is in charge of the Clan Council and report to the Paramount Ruler. Each of the Communities is headed by the Village Head (*Ete Idung*) who co-ordinate the activities of individual families. The Village Heads are aided by the Village Council constituted by the Village Head; Each Village Council is headed by an appointed Chairman with members made up of the extended family Heads, Youth Chairman and the Woman Leader. The extended family Head (*Obong Ekpuk*) and the nuclear family Head (*Obong Ufok*) takes care of their respective families at these levels.
- The traditional institutions provide leadership at the local level by dispensing justice and upholding the cultural heritage of their communities. Community Based Organizations (CBOs), Youths and Women Associations are also put in place to help in the development of these communities. In the communities sampled, the political structure and governance remain same.
- The projected population of the surveyed communities using the exponential growth rate model and an annual growth rate of 3.2% for Akwa Ibom State (NPC, 2006) and based on 1991 population census result is given in **Table 5.2.** The population of the surveyed communities in the project area gives a total population of 5,985 people made up of 4,163 males and 3,631 females in 1991. The projected population estimates for the project communities also indicate a population of 12,501 people in 2006, 16,598 people in 2015 and 19,429 people by the year 2020. The estimated population is widely dispersed between and among the communities.

Community Perception and Concerns

Community Perceptions

The project community is used to the presence and operations of public and private sector industrial and institutional projects, and the usual land take to support these projects. They had equally participated in a number of EIA studies, previously. Given past experiences with other companies in the area, various groups in the communities expressed their thoughts, expectations and concerns about the proposed project.

The general perception was that the project would potentially provide benefits to the community and residents. Community residents pride themselves as receptive, peaceful and accommodating.

Community Concerns

Although the community perceives the project as beneficial in various regards, residents had a number of concerns about its operations.

The following concerns were however raised in the project communities during the consultation meetings:

- Employment opportunities to be given to indigenes of the project communities during the construction work and project operational phase especially in the skilled areas.
- Provision of infrastructures and social amenities in the project communities especially potable water and electricity supply which has raised a major concern in the area following the closure of ALSCON Company that supplied light to the host Communities.
- Proper documentation of the ancestral/sacred sites for necessary action.
- Environmental management plan to be put in place for incidences during the course of their operations.
- Traditional Institutions and organizations in the host Communities to be well catered for.
- Appropriate memorandum of understanding (MoU) to be put in place between the project communities and the project proponent.

HEALTH BASELINE DESCRIPTION

Health Data Gathering

Collected data on:

- Access to drinking water,
- Quality of drinking water,
- Access to sanitation facility,
- Housing characteristics,
- Waste management,
- Household food security,
- Use of alcohol and tobacco,
- Sexual behavior and knowledge of HIV/AIDS,
- morbidity and mortality patterns
- Health facilities in the communities.

The following tools were deployed:

- Focus Group Discussions/Key Informant Interviews
- Administration of Questionnaires
- Anthropometric measurements and other health parameters

Secondary data:

- Reports of Disease Surveillance and Notification (DSN)
- Health services data generated by health facilities that serve the communities
- Visit of government agencies / parastatals by EIA consultants
- National Population Commission
- Bureau of Statistics
- Akwa Ibom State Ministry of Health
- Akwa Ibom Hospital Management Board

Health Assessment

Health Facilities and Services.

There are orthodox and traditional health care providers in the communities. The orthodox facilities are represented by a General Hospital at Ikot-Abasi, a Primary Health Centre at Uta-Ewa without a permanent medical doctor and six (6) privately owned clinics which tends to increase their medical expenses. In addition there are two main commercial pharmacies and some drug stores in the communities. The drug stores are irregularly distributed in the communities and their number could not be determined during the study.

The traditional health care services are those provided by traditional birth attendants (TBAs) and herbal medicine practitioners. The numbers and distribution of these practitioners in the communities could not be determined during the study.

The orthodox facilities provide antenatal services, immunization services and general medical services. There are TBAs and those who sell herbal remedies in the communities. The TBAs mostly provide body massage and local antenatal services to some of the local pregnant women. They also manage these pregnant women through the periods of their pregnancies.

A number of places sell concoctions of herbs and alcohol in the communities which are believed to cure several ailments especially malaria, waist pain and hemorrhage (pile).

Utilization of Health Services

The dominant health care services used by household members in the study area, four weeks preceding the study, are presented in **Table 4.35**. The most patronized facility is the drug stores, at 44%. Household members frequently bought drugs from drug stores any time they feel ill without a doctor's prescription. Some even go to consult the attendants at these stores on drugs to take when they are ill. The practice of self-medication is quite common in the communities. About 32% of households use the services of orthodox facilities. Some use public and private facilities located at Ikot-Abasi. The services of TBAs are used mostly by women during pregnancy and child birth, and this is represented by 18.0%. Visits to herbalists and churches for treatment of ailments were not common. However, a number of residents took herbal concoctions.

Patronage of Health Services in the Study Communities.

Available Health Care Service Providers	**Frequency**	
	(No.)	**(%)**
Hospitals/Health Centres	16	32.0
Chemists/Drug Stores	22	44.0
Traditional Birth Attendants (TBAs)	9	18.0
Herbalists/Traditional Medicine Practitioners	2	4.0
Churches/Spiritual Healing Homes	1	2.0
Total	50	100.0

Waste Management Practices

The Local waste management practices are poor, crude and unorganized except in few households and locations. Domestic wastes are dumped by the riverside or at the backyards of households. Sanitary wastes are also treated likewise, especially in the riverine areas. Discharge of raw sewage into the creek water is the main source of pollution in the study area.

Availability of pit toilets in upland areas make for more organized sanitary waste disposal procedure. These facilities have to be well maintained and sanitized to avoid them becoming health hazards as they may percolate and seep slowly into the shallow hand dug water wells.

Refuse on the shoreline and the back yards also constitutes breeding sites for vector such as flies and mosquitoes that result in such diseases as diarrhea, cholera, malaria, typhoid, warm infections, etc. However, some of the modern bungalows are using water system toilets in their residence which reduces the incidences of these health hazards.

Impact Assessment Methodology

Associated Potential Impact

Associated and potential negative or positive impacts of the project on biophysical, social and health aspects of the environment were identified in line with project activities including site clearing, construction, transportation, excavation sand filling etc; process impacts i.e. operational impacts and those on resource utilisation. These impacts were quantified and qualified. Cognisance was given to levels of impact as short/long term, reversible/irreversible, direct/indirect, adverse/ beneficial as well as cumulative impacts.

Risk assessment was based on the HAZOP model. It was recommended that while positive impacts be enhanced, the negative ones should be mitigated to reduce or eliminate along all phases of the project. On the level of significance, impacts were rated high, medium, moderate, or low depending on their severity on the environment.

RESULTS OF THE IMPACT ASSESSMENT

The significant potential impacts of the proposed project were identified as those impacts to which the following conditions apply.

- Major significance = Impacts for which (L+R+F+I+P) is ≥ 15 with a consequence/likelihood rating of: 3E, 4D, 5C, 5D and 5E.

- Medium significance = Impacts for which (L+R+F+I+P) is between 10-14 with a consequence / likelihood rating of: 2D, 2E, 3C, 4B, 4C, 5A, 5B.

- Minor Significance = Impacts for which ((L+R+F+I+P) is ≤ 9 with a consequence/likelihood rating of: 1A, 1B, 1C, 1D, 1E, 2A, 2B, 2C, 3A, 3B, 4A.

IMPACT MITIGATION MEASURES

The recommended mitigation measures first dealt with the use of industry best practices available and sustainable technology in line with the Environmental Laws of the Federal Republic of Nigeria.

At the core of these measures were steps that eventually result in the wellbeing of the communities, environmentally friendly.

The cost effective measures have been proffered with reference to best practices and HSE considerations. It is worthy of note that the mitigation measures for each significant and adverse impacts of the proposed project activities were basically the same irrespective of the project phase.

A major mitigation for the potentially adverse impacts would be empowerment of the local populace. This could involve programmes aimed at enhancing the potentials of vulnerable groups, like skills acquisition training and introduction of micro credit schemes. Women and youth in the communities would be the primary target for these programmes.

Environmental Management Plan

- FMEnv/DPR and Banner Energy Limited shall carry out monitoring of implementation of mitigation measures in liaison with BEL and the EPC Contractor to ensure that no deviation from the plan occurs.

- Part of the EMP is to put community development programmes in place to avoid third party agitation.

- Guidelines are provided to cater for specific project activities, emergency response procedures, and inspection procedures.

- Phased Environmental auditing is a vital part of the EMP while definite roles and responsibilities are assigned to particular stakeholders.

- In order to build capacity for locals in the industry, training programmes shall be mounted during which beneficiaries are empowered to carry out similar projects elsewhere with minimal supervision.

Conclusions

- The BEL 500MW CCPP Project will improve power generation by an increase in grid based power generation capacity through utilization of abundant gas reserves in Nigeria. The LPG Storage Depot will bring an increase in availability of LPG to local consumers.
- Contribute to the nations drive towards achieving rapid growth of reliable power supply
- Environmental and social aspects and impacts has been identified and assessed in a structured and formal manner
- The identified adverse impacts were generally short-term and can be prevented, reduced, ameliorated, or controlled if the recommended mitigation measures are implemented
- The EMP will form the basis for the actual project implementation and future monitoring of environmental components
- The approval of this ESHIA report for the execution of the proposed power plant/LPG Storage Depot project is recommended.

Thank You