**LAMU COAL Power Project: ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT SUMMARY**

**Project Title:** Lamu Coal Power Project  
**Country:** Kenya  
**Division:** RDGE.1  
**Project Number:** P-KE-F00-009  
**Department:** RDGE  
**Project Category:** Category 1

### 1 INTRODUCTION

Amu Power Company Ltd. (APCL) proposes to develop a 1050MW coal fired power plant in the Kwasasi area of Hindi/Magogoni sub-county, Lamu County, Kenya. The project promoter, APCL is a project development company with main sponsor, Gulf Energy Limited (lead sponsor). Gulf Energy Limited is a leading oil marketing company in Kenya and also owns an 80MW medium speed diesel (MSD) power plant in Athi River, Kenya.

The proposed coal fired power plant will be situated approximately 21 km north of Lamu town, within an area that the Lamu Port South Sudan Ethiopia Transport (LAPSSET) Corridor Development Authority (LCDA) has been allocated land by the Government of Kenya. The proposed coal fired power plant was envisaged as part of the transport corridor project. The proposed Lamu coal power plant is one of two coal power plants that will enable Kenya to develop an efficient cost effective source of electricity as part of the 5000+MW power generation program embarked on by the Ministry of Energy and Petroleum in September 2013. The power generated will be evacuated to Nairobi East Control Centre via an overhead double circuit 400kV transmission line (TL) which will be approximately 520km long; the TL is an associated facility to the coal power plant and will be developed by the Kenya Electricity Transmission Company (KETRACO). An independent ESIA Study for the above transmission line project has been undertaken.

The ESIA Study for the proposed coal fired power plant was undertaken in accordance with the Integrated Safeguards System (ISS) of the African Development Bank and the 2012 Environmental and Social (E&S) performance standards of the International Finance Corporation (IFC). Figure 1-1 shows the approximate location of the proposed coal fired power plant.

**Figure 1-1: Image showing project site location**

![Figure 1-1: Image showing project site location](image-url)
2 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 Constitution of Kenya
The Constitution of Kenya, promulgated in August 2010, is the parent law in the country and among several things, states that every person in Kenya is entitled to a clean and healthy environment. Chapter 5 of the Constitution states that land and the environment must be managed in a sustainable manner. The Constitution also provides for sound protection of ecologically sensitive areas such as mangroves.

This Policy articulates the need for a cost effective, reliable electricity supply as a key enabler for the realization of Kenya’s economic blueprint referred to as Vision 2030.

2.3 The Energy Act 2006
This law was promulgated following the approval of the Energy Policy 2004 and created a regulator known as the Energy Regulatory Commission (ERC) which is (a) the licensing authority for the electric power sub-sector, (b) responsible for approving the Power Purchase Agreement (PPA) and, (c) granting an Electric Power Generating License to an entity.

2.4 Environment Management and Coordination Act, 1999 (EMCA)
This is the principal statute for the sustainable management of the environment in Kenya. This statute requires that any project listed in the Second Schedule of the Act must mandatorily undergo a full Environmental and Social Impact Assessment (ESIA) Study prior to commencement. The EMCA is operationalized through several subsidiary regulations such as:
- Environment (Impact Assessment and Audit) Regulations, 2003. The ESIA Study has been undertaken in accordance with the requirements set out in this regulation;
- Environmental Management and Coordination (Water Quality) Regulations, 2006. This regulation deals with the proper management of effluent emanating from a facility including stipulation of discharge limits and licensing of effluent discharges;
- Environmental Management and Coordination (Waste) Regulations, 2006. This regulation deals with the environmentally sound management of wastes emanating from a facility;
- Environment Management and Coordination (Noise Pollution and Vibration Control) Regulations, 2009 which deals with the environmentally sound management of ambient noise generated by a project.

2.5 Occupational Safety and Health Act 2007 (OSHA)
The OSHA in Kenya is modelled around the International Labor Organization (ILO) Conventions and is a progressive piece of legislation for the protection of labor and working conditions. All workplaces in Kenya that employ 2 or more people, must fully comply with the requirements of this statute and its subsidiary legislation.

2.6 The Land Act 2012
The Land Act of 2012 provides for the legal regime that governs inter alia, the administration and management of public and private land; contracts over land, leases, charges, compulsory acquisition, easements and related rights and manages under the mandate of the National Land Commission (NLC). The proposed coal power plant is to be constructed on land tenured as community land and held in trust by the County Government of Lamu. The Kenyan Ministry of Energy and Petroleum (MoEP) is responsible for providing the land for the proposed coal fired power plant free of encumbrances to the project developer. The MoEP will ensure that land acquired for the project is done according to the provisions of the Land Act which includes fair and just compensation for project affected persons (PAPs).

2.7 County Governments Act 2012
This Act stipulates the development planning processes to be followed by County Governments in Kenya. For the Lamu power plant, such a plan needs to be approved by the County Assembly of Lamu, after which the coal fired power plant will be included in the CIDP for future planning purposes. The
County Assembly of Lamu unanimously approved the Coal fire power plant and communicated its decision to the County Government of Lamu which will now include this project in the spatial development plans for the County.

2.8 The Physical Planning Act 1996
The Physical Planning Act, 1996 (PPA) is the principal legislation in Kenya dealing with the formal approval of development planning permissions. The principal statute delegates authority for physical planning at the County level to the County Governments. Subsequently, the PPA will be applicable as the development planning process stipulated in the Act will be followed in order to get development planning permission for the coal fired power plant.

2.9 The Water Act 2002
This Act will be applicable to the proposed project as a fee will need to be paid by the Proponent to the County Water and Sewage Management Board for water abstraction and use during the construction and operational phases of the project.

2.11 The National Museums and Heritage Act 2006
The National Museums of Kenya (NMK) will enforce their function through mitigation measures proposed and management plan given in the Archaeological and Cultural Heritage Impact Assessment (ACHIA) Study undertaken as part of the ESIA Study.

2.12 The Fisheries Act 1978
This Act will be applicable to the proposed project as it regulates the fisheries activities in Kenya including the Manda Bay. Within Manda Bay, there are several fishing areas including some which may be near the circulating water intake and outfall of the power plant; these would be regulated by the Director of Fisheries within the definitions of the Act.

2.13 Conventions, treaties and agreements
Kenya is a signatory to several conventions, treaties and agreements relevant to environmental sustainability and those relevant to the proposed power plant are discussed in Section 2 of the ESIA Study. Below is a list of the relevant conventions discussed in that section.

- United Nations Framework Convention on Climate Change (UNFCCC);
- Kyoto Protocol to the United Nations Framework Convention on Climate Change;
- African Convention on the Conservation of Nature and Natural Resources;
- Convention on Biological Diversity (CBD);
- Convention for the Protection, Management and Development of the Marine and Coastal Environment of Eastern Africa Region (Nairobi Convention);
- Convention For The Protection Of The World Cultural And Natural Heritage;
- Convention On The Prevention Of Marine Pollution By Dumping Of Wastes And Other Matter;
- International Convention for the Prevention of Pollution from Ships (MARPOL);
- Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and Their Disposal;
- The African Charter on Human and Peoples Rights;
- International Covenant on Economic, Social and Cultural rights, 1966 and international covenant on civil and political rights 1966;
- Ramsar convention on Wetlands (1971, amended in 1982 and 1987);
- UNESCO, World Heritage Convention;
- UNESCO Convention for safeguarding the intangible cultural heritage, 2003;
- UNESCO Convention on the protection and promotion of Diversity of Cultural expressions 2005;
- UN Declaration on the Rights of Persons belonging to National or Ethnic, religious and Linguistic Minorities (1992).
2.14 African Development Bank Policies and Operational Safeguards

Several African Development Bank’s policies and operational safeguards will be applicable to the proposed coal fired power plant. Some of the policies that the project will need to comply with include:

- Energy Sector Policy of the African Development Bank Group. The Energy Sector Policy is founded on nine guiding principles of which environmental and social responsibility is one of them. Under this principle, the AfDB advocates for a viable balance between economic, environmental and social considerations in a project life cycle;
- Integrated Safeguards System which comprises 5 operational safeguards (OSs) which include:
  (i) OS1: Environmental and Social assessment, 
  (ii) OS2: Involuntary resettlement land acquisition, population displacement and compensation, 
  (iii) OS3: Biodiversity and Ecosystem Services, 
  (iv) OS4: Pollution prevention and control, hazardous materials and resource efficiency, and 
  (v) OS5: Labor conditions, health and safety;
- African Development Bank Gender Mainstreaming Policy; and
- AfDB Operational Guidelines for Coal Power Plants.

3 PROJECT DESCRIPTION, DESIGN AND JUSTIFICATION

3.1 Description of the project

This project will involve the construction, operation, and maintenance of a 1,050 MW coal-fired power plant located at the Indian Ocean end of the Lamu Port-South Sudan-Ethiopia Transport Corridor (the “LAPSSET”) project at Manda Bay in the Lamu archipelago within Lamu County and includes construction of coal handling facilities, including jetty/coal offloading infrastructure and a 400kV switchyard at site. The plant will run on steam provided by three super-critical boilers, three steam driven turbines (350 MW each) that will power three generators of similar size to produce the electricity. With an expected annual dispatch factor of 85%, the plant will feed 7,308,249 MWh into the national grid annually.

The project technology is based on super-critical heating of pulverized coal which ensures the highest efficiency in burning coal to reduce Greenhouse Gases (GHG) emissions. In addition, the project will include a wet Limestone Flue Gas Desulphurization (FGD) System to minimize Sulphur dioxide emissions, Low Nitrous Oxide Burners to be used in combustion technology to reduce Nitrous Oxide emissions and High Efficiency Electrostatic Dust Precipitators (ESP) for particulate removal.

3.2 Project Components

The key project components will include:

- Three high-pressure supercritical units each of 350MW, with condensing steam turbines operating as base load capacity;
- Coal receiving berth at Kililana with coal off-loading and handling equipment;
- Construction of a terrestrial based coal conveyor system (~15km long) complete with transfer towers between the coal receiving berth at Kililana and the coal stock yard within the project site;
- A coal stock yard with 38 days’ storage capacity, including 20 days of Security Stock;
- A 1270mX900m Ash yard, 25.8 m high and designed for a storage capacity of 15 years;
- Construction of a Limestone receiving system and gypsum handling system;
- Construction of a once-through sea water cooling system;
- Construction of a Flue gas air quality conditioning equipment including a 210m tall chimney. This includes a flue gas desulphurization system and electrostatic precipitators;
- Development of Sea water desalination facilities to meet the demand for the power plant’s process water, service/fire water as well as water for domestic use;
- A Sub-station and switching facilities up to the 400 kV overhead line gantries for power evacuation into the KETRACO 400 kV system.
- Distributed control system (DCS) for monitoring and control of plant operation;
- Buildings, roads, and other structures for the Project;
- Auxiliary boiler and black-start diesel generator (DG); and
• A permanent workers’ colony for the operational phase of the project having a capacity to accommodate 250 – 300 persons.

3.2.1 Associated facilities: Machakos-Lamu Power Transmission line:
The power generated by the 1,050MW Lamu coal fired power plant will be evacuated to the Nairobi East Control Centre via an overhead double circuit 400kV transmission line. This project is an associated facility to the coal power plant and will be developed by the Kenya Electricity Transmission Company (KETRACO). The transmission line will be 520km long and will traverse the counties of Lamu, Garissa, Tana River, Kitui, Machakos and Nairobi. An independent ESIA Study for this T-line project has been undertaken.

4 DESCRIPTION OF THE PROJECT ENVIRONMENT

Key among the baseline environmental conditions examined during the environmental and social assessment were the following aspects:

4.1 Topography, geology and soils: Topography of the area is generally flat. The project site lies in the bonding zone of coastal plain and the Manda Bay, with Manda Bay located on the east, terrestrial land on the west, and a wide and short seasonal gully (flooding area in spring tides) on the north. The topography of the site is such that the land generally slopes eastwards towards the Manda Bay, implying that surface water mainly drains to the sea from west to east. In terms of geology, the project site is mainly covered by the Quaternary overburden layer with superficial soils and marine sediments without any deep fault distribution around the site. According to Meteorological Department in Kenya, the earthquake magnitude around the project site is generally less than 5 on the Richter scale. Based on these factors, it is deciphered that the geological tectonic conditions within the project site and its environs would be of good stability. The surface is covered by sandy soils which are fluvial in character, with black cotton soils present along drainage channels and are also found overlying the tertiary and quaternary sediments along the drainage channels.

4.2 The land tenure around the proposed Lamu coal power plant is communal and held in trust by the County Government of Lamu. The land on which the proposed coal fired power plant is to be built is currently used for subsistence agriculture, with farmers cultivating mostly maize, sim sim, and other food crops for subsistence purposes or as cash crops. Some pastoralists were also observed grazing their cattle in the project area. However, the land use at the proposed project site, together with other LAPSSET projects, will convert from communal to commercial or industrial.

In addition to agricultural use, the tidal areas within Manda Bay contain sizable amount of mangroves which provide ecosystem services to the communities within the Kwasasi area.

4.3 Air quality: The construction, commissioning and operation of the proposed coal fired power plant may have potential negative impacts upon the ambient air quality of the local area. To determine the baseline conditions around the project site and its environs, an air quality survey for PM10 and PM2.5 was undertaken by SGS Kenya Limited on February 10th – 17th, 2015 and covered ten sampling sites, including, among others, in the villages of Bargoni, Ngini, Bobo, Jipe, Hindi, as well as Mokowe Primary school. Data obtained showed the baseline air quality conditions to be well within World Health Organization (WHO) guidelines and also compared favorably with Kenya Draft air quality guidelines.

4.4 Marine Biodiversity: Marine resources in Lamu County are well represented by three major communities: mangroves, sea grasses and coral reefs. The project site is located next to Manda Bay that is well sheltered from the open ocean. The oceanography of the area is characterized by upwelling of cooler nutrient rich waters, resulting in a highly productive marine ecosystem with rich populations of fish, crustaceans and mollusks, and abundance of migratory species such as seabirds and turtles.

The three main marine ecosystems (i.e., mangroves, sea grasses and coral reefs) are strongly interlinked and dependent on each other ecologically. The mangroves protect sea grasses and coral reefs from
terrestrial natural and anthropogenic influences e.g., sedimentation and pollution while coral reefs protects mangroves and sea grasses from strong waves. Sea grasses filter sediments and take-up nutrients and in the process control sediments from reaching coral reefs, which are so sensitive to turbid water. The Mangroves of Lamu are said to constitute 75% of mangrove forest cover in Kenya that is approximately 45,960 ha or 3.0 % of the country’s forest cover. About two million people live on the Kenyan coast, mainly around Mombasa, with a significant percentage of them using reefs for fishing and tourism activities (Obura et al. 2002).

4.5 Terrestrial ecology: The proposed site for development of the coal power plant lies in a predominantly shrub savanna habitat with open to closed canopy thorny bush of Commiphora and Salvadorapersica. Identified habitat types included farmland, woodland, grassland and mangroves which support a variety of biodiversity. These habitats are important for the habituation of amphibians and reptiles. The mangroves serve as the breeding sites for the sea turtle along the sandy beaches. 154 species of reptiles (105) and amphibians (49) are known to occur in Lamu. The Triton shell (Charonia tritonis), Seahorse (Hippocampus kuda) and Spiny lobster (Palinurus sp.) are threatened species also found in Lamu. It has previously been reported that the general project area is known to be a ranging site for a number of large mammal species including the Topi, Buffalo, Elephant and Wild Dog. Giraffe, Buffalo, Hippopotamus, Lamu Topi; Waterbuck and Gazelle, however throughout the ESIA phase, there were no observations made of these wild animals.

4.6 Socio-cultural baseline and Ethnic composition: Lamu County’s population is a fusion of indigenous communities and a migrant community composed of individuals who have settled in Lamu for business and employment. Lamu County is best known for its tourism facilities, cultural festivals, UNESCO World Heritage Site status since 2001 and one of the earliest and best known bastions of the Swahili language. The main indigenous communities, all of which are listed as indigenous minority communities in Kenya, include the Orma (2% of Lamu County population) - semi-nomadic pastoralists whose main source of livelihood is the rearing of cattle, goats and sheep; the Sanye – one of the smallest sub-groups in Kenya, Boni (Aweer) – traditionally forest dwellers and hunter-gatherers and make about 5% of the Lamu County population, and Bajuni, the main ethnic group constituting bout 46% of the Lamu County population) - these trace their roots from Bantu and Arab descent and mainly derive their livelihoods from fishing and farming.

Other indigenous communities include the Korei, Swahili, Arabs, Kikuyu, Mijikenda, Pokomo/Riverine, Somali, Luo, Luhya, Taita and many others. The Swahili/Shirazi and the Arabs constitute 1% and 6% of the population respectively, are mainly in the trading centers.

Culture: Lamu County is host to a myriad of rich archeological and cultural resources. Recorded back to at least the 12th century, Lamu Old Town is the oldest surviving Swahili town in East Africa. It is also the administrative capital of Lamu County today. In December 2001, an area of 16 hectares of Lamu Old Town was inscribed as a world heritage site by UNESCO’s World Heritage Centre. It is the best-preserved Swahili settlement, retaining its original character and functions. The town is built in coral stone and mangrove timber, and is characterized by simple structural forms enriched by distinctive features such as inner courtyard, verandas and elaborated carved wooden doors. There are over 160 historic houses clustered in within the Stone Town.

4.7 Fishing: Fishing is the second largest driver of the Lamu economy. The County produces over 1,500 metric tons of fish annually valued at KShs111.8 million. 75% is from marine fishing and 25% from fish pond programs on the main land and ox-bow lakes and water masses at the Tana River delta.

4.8 Hydrology and hydrogeology: There are no rivers in the vicinity of the proposed project site. Surface water drains to the sea from west to east in a scattered mode. Due to the flat topography, surface water may accumulate over the project site during the rainy season. Ground water within the site varies between 2.8m and 7.8m.
4.9 Livelihoods: Lamu County’s labor force stands at 54% but the majority are unskilled. Poverty levels are 31.6 %, with the main economic activities being tourism, fishing, crop production and livestock husbandry. The national literacy rate is around 70% but Lamu’s one is below 30%.

5 PROJECT ALTERNATIVES AND THEIR RESULTS

A range of options for various environmental issues on the project were considered.

5.1 Waste water discharge: With regard to waste water discharge options for cooled water into the ocean, a submerged pipes with a diffuser at the end of it will be installed for cooling water discharge.

5.2 Energy supply alternatives:
Nuclear power, large hydro power, geothermal power, natural gas power, coal fired power, medium speed diesel power, solar power, and wind power were considered. Based on an analysis of the various energy supply alternatives, it was established that the coal fired power plant would have the following benefits over all other sources of energy:
- Coal power had the lowest levelised cost of electricity (LCOE) of US$7.52/kW hour;
- Coal fired power plant has a relative quick development timeline to commercial operation date (COD) and is second to a natural gas fired power plant;
- Coal fired power plants technology is proven over many years and continuous improvements are being made in order to make them more efficient and environmentally sustainable;
- It is easy to get professionals globally for coal fired power plants.

5.2 Location alternatives:
Three locations were identified and one of the discarded options was due to ecological risks, high costs, operation and maintenance challenges and the other due to being outside of the Port area.

5.3 Technology alternatives:
There are three technologies that are available for coal fired power plants namely, sub-critical, super-critical and ultra-super-critical. There is a large inventory of coal fired power plants around the world that use super-critical technology which is superior to sub-critical technology. There is a small inventory of ultra-super-critical power plants around the world.

5.4 Coal transportation alternatives:
The proposed power plant will utilize about 3,600,000 tons of coal per annum. It will have a 38 days storage capacity including a 20 day security stock. Alternatives to coal transportation include (i) coal can be received in large bulk ship carriers at the entrance of Manda Bay, offloaded into smaller barges which then transport it to a coal receiving jetty near the project site. For this alternative, a new coal receiving jetty will need to be constructed near the power plant project site; (ii) the second option would be to use Kenyan coal. This requires development of a coal mine in Kitui County, construction of 350km of rail and having rolling stock to transport the coal to the power plant; (iii) the third option and the most preferred is to use a large bulk ship carrier which can dock at one of the three new berths currently under construction in Kililana and off-load coal onto a land based conveyor system connected to the project site. The third option is the one that the coal power plant will employ.

5.5 Do Nothing Alternative:
The do nothing alternative is the option of not constructing the proposed 1,050 MW Lamu Plant. Whilst this alternative would not result in environmental or social impacts of the Project area, this was not considered to be feasible given the Government of Kenya’s energy strategy.

---

1 KNBS & SID - Exploring Kenya’s Inequalities - Lamu County (2013)
6 POTENTIAL ENVIRONMENTAL IMPACTS

For the proposed coal power plant, most environmental impacts are envisaged to occur during the construction and operational phases respectively. Among the key Impacts identified are the following:

6.1 Positive Impacts:

6.1.1 Potential impacts on electricity supply - The proposed project will inject about 981.5 MW of electricity into the national grid as part of the Government of Kenya’s Least Cost Power Development Plan (LCPDP) for power generation, thus bringing down the cost of power via a stable, cheaper, reliable platform.

6.1.2 Potential impacts on employment opportunities - The proposed project is anticipated to generate about 1,800 direct skilled and unskilled employment opportunities for the local community and migrant workers. It is also anticipated to create indirect and induced employment opportunities at the local, regional and national levels through project related procurement and contracting, and spur economic growth nationally. APCL has set aside 1,000 direct job opportunities for persons born in Lamu County and will provide free technical skills training with the view of offering them employment opportunities within the project. Additionally, through its Corporate Social Responsibility (CSR) program, APCL envisions to collaborate with the County Government and other development actors to support the improvement of education services in the County.

6.1.3 Potential impacts on economic growth - It is anticipated that the proposed project will stimulate economic growth for the local community in Hindi/Magogoni sub-county and Lamu County through enhanced markets for local products and services, increased individual income, infrastructural development and increased investments, and tax revenues. The proposed project is also envisaged to spur economic growth nationally through increased access to affordable and reliable power by industries and Micro Small and Medium Enterprises (MSMEs). Additionally, the cumulative benefits from the projected economic growth are expected to enhance living standards and improve the general quality of life for the communities in Lamu and the country at large. This may be realized through employment creation leading to poverty reduction and improvements in infrastructure and related services such as health and education.

6.1.4 Potential impacts on County revenue and development expenditures - The County Government of Lamu is expected to directly benefit from the proposed coal power plant, in terms of approval fees, license fees, land rates etc. APCL will pay a one-off Land standard premium of KShs 117,000,000 and annual land rent of KShs 23,000,000 to the Government, for development of the coal fired power plant. Depending on the services provided by the County Government, APCL will also be required to pay land rates for the leased project site. This will contribute to the County Government’s annual revenue streams throughout the lifetime of the Project and increase potential scope of County Government development expenditures.

6.1.5 Potential impacts on infrastructural development - Lamu County generally suffers from poor infrastructure. It is envisaged that the local community and Lamu County in general, may benefit from the infrastructural developments directly attributed to the project such as possible improvements of roads proximate to and/or connected with the proposed project site and construction of education and health facilities. The expected economic growth of Lamu County is also anticipated to result in developments of transport, health and communication infrastructure.

6.2 Potential Negative Impacts

6.2.1 Potential air quality impacts
The location of the proposed coal fired power plant is in a rural setting in which the ambient baseline air quality was measured and found to be good based on 2005 WHO guidelines
The construction and operation of the proposed coal power plant may have potential negative impacts upon the ambient air quality of the local area. Pollutants of concern that were assessed include sulfur oxides, nitrous oxides, particulate matter (fugitive dust from coal handling and storage activities measured as PM10 and PM2.5) and selected metals such as mercury, arsenic, nickel, lead and cadmium.

During the construction phase, expected to take approximately 42 months, air emissions would potentially arise from vehicle movement, exhaust emissions and excavations. During the operational phase, air quality impacts will mainly emanate from the burning of coal in the three boilers, storage and transportation of coal, ash and limestone, etc.

### 6.2.2 Potential noise quality impacts during both construction and operation-phase

As is often the case with the use of heavy equipment, noise impact and ground vibration during construction can disturb nearby communities. However, the remote location of the project site coupled with vegetated topography surrounding it can partially absorb or reflect the noise, reducing the levels that reach the receptors. During the construction phase, noise will mainly emanate from construction plant and equipment and this may have intermittent impacts on the workers within the project site.

During the operational phase, the main sources of noise and vibration will be (i) delivery of equipment and raw materials by trucks; (ii) transfer of coal through conveyor; (iii) operation of engines, generators, and turbines inside powerhouse; and (iv) operation of various pumps, fans, and motors. The proposed project design includes a permanent workers’ camp that will be built for the staff members that will be operating the power plant. It is anticipated that without adequate mitigation measures, these workers will be adversely affected by the continuous noise exposure through the above sources.

### 6.2.3 Terrestrial and marine ecological impacts:

Construction of the plant at this shoreline area is expected to trigger some terrestrial and marine ecological impacts, including, among others; habitat loss, loss of biodiversity resources such as trees, grass and other vegetation within the immediate project footprint area (about 80 hectares); as well as outside the project footprint area as a result of the increasing population that may strain the existing ecosystem services; and impacts of construction and operation of the coal power plant on the coral reefs, sea grass beds and mangroves within Manda Bay.

### 6.2.4 Waste water discharge:

The project will discharge heated waste water/effluent into the sea from the power station process water systems and which could potentially affect the Manda Bay’s marine biodiversity which includes mangroves, coral reefs and sea grass beds. During the operational phase, the proposed coal fired power plant will use a once-through seawater system for cooling and condensing the steam for return to the boiler. The temperature of the water discharged at the cooling water outfall will be higher (in some cases, by up to 9°C at the discharge outlet) than the ambient temperature entering the cooling water intake which can potentially have localized adverse effects on marine flora and fauna. The average ambient water temperature within Manda Bay is about 25°C – 27°C. The elevated temperature at the discharge outlet could potentially affect the marine ecology in the vicinity of the discharge outlet. International best practice and national legislation allow a maximum variation of 3°C.

### 6.2.5 Construction-phase related impacts:

such as improper disposal of excavated soil material that could potentially be eroded to the nearby water body; discharge of silt or sediment laden surface water runoff into local watercourses from excavation activities and enhanced soil erosion from loose excavated soil; contamination of surface water from the spillage/leakage of fuels from vehicles and machinery as well as fuel/chemical/waste from storage areas during the construction phase.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range in the Project area</th>
<th>2005 WHO guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO2</td>
<td>2.2-26.6 µg/m³</td>
<td>40 µg/m³</td>
</tr>
<tr>
<td>SO2</td>
<td>&lt;10 µg/m³</td>
<td>50 µg/m³</td>
</tr>
<tr>
<td>PM10</td>
<td>0.2-16.5 µg/m³</td>
<td>50 µg/m³</td>
</tr>
<tr>
<td>PM2.5</td>
<td>0.1-18 µg/m³</td>
<td>35 µg/m³</td>
</tr>
</tbody>
</table>

The table above lists the range of pollutants in the project area compared to the 2005 WHO guideline.
6.2.6 Hydrology: The project area receives quite high rainfall on average. Intense and heavy storms of over 200mm in a day are common in the wet season. This amount of rainfall has potential to generate enormous volumes of flow which are likely to cause water logging, flooding and bank erosion. Being a flat area, the project area has a high potential for flooding and water logging.

6.2.7 Potential ground water contamination from leachate from the ash dump could contaminate groundwater.

6.2.8 Occupational Health and Safety (OHS): Impacts on worker and community health and safety are anticipated to arise from hazardous air emissions if not mitigated and work related accidents at the power plant as well as from working at heights and working with heavy machinery and occupational diseases due to exposure to dust and other hazardous substances.

6.2.9 Negative Social Impacts: Potential negative social impacts include loss of livelihoods such as fishing, tourism, and agriculture as fishermen may need to fish in deeper waters without adequate fishing equipment and boats; negative visual impacts of the coal power plant to tourists visiting Lamu’s beaches in Shela and Manda areas without sufficient buffer zones or screens may affect aesthetics in the area. With the additional cumulative impacts associated with development of the wider LAPSSSET master plan, there may be changes to land use in the Kwasasi area from agricultural to residential; the anticipated population growth may strain the limited existing infrastructure and social amenities within Lamu County; loss of cultural heritage resulting from the vagaries of economic growth.

6.2.10 Cultural heritage: Whereas the proposed project site is not located within any United Nations (UN) Classified Indigenous Peoples Land, it is critical to address needs and expectations of ethnic groups and rural communities who have different traditions and are often vulnerable to project-induced risks. There are a number of different ethnic minorities living in the Kwasasi area including the Bajuni, Boni (Aweer), Sanye and Orma and their exposure to immigrant labour lifestyles is of concern as it could negatively impact on their cultural traditions. Over time, these communities have refined their traditional ecological knowledge to comfortably survive in their environment. However, immigrant labour factors and population pressure, urbanization and the additional pressure on resources could pose a great threat to their traditional way of life tilting survival balance and making life unfavorable for the indigenous communities. Archeological artifacts could also be uncovered during the construction phase and will need to be recovered.

Currently, the Kwasasi area and its environs maintain an undisturbed cultural landscape where the houses are built from the local materials and there is a sense of uniformity in the style of construction. The project could trigger new developed and emergence of a new urban center with new architecture.

6.2.11 Visual and aesthetic impacts: Due to the relatively flat nature of the landscape in the project area, the viewshed analysis and photomontages show that the project will be conspicuously visible and the line of sight analysis indicates that the 210m chimney will be visible from areas located more than 10km away from the project and draw people’s attention to the project. The project will also be located outside any defined urban edge or industrial area and will therefore create an initial change to the fabric and character of the landscape, thus inducing visual sensitivity to the area.

6.2.12 Land acquisition and involuntary resettlement: The project sponsors have secured land from the GoK through Lapset Corridor Development Authority (LCDA) for the project, with rights of approximately 975 acres. The land sub-lease term is 49 years and to cover the period required for construction, operation and decommissioning. In view of this, no involuntary resettlement is envisaged for the power plant site and immediate associated infrastructure.
6.2.13 Potential climate change and Greenhouse Gas impacts: Like most coal power plants, the project could potentially generate Green House gases estimated at a proximately 9.0 million tonnes CO₂e per year when the plant is fully operational. Without mitigation, the proposed project will increase greenhouse gas emissions in Kenya by approximately 6% to 10% on 2010 figure of 73MtCO₂e.

6.2.14 Potential waste management impacts: The potential impacts associated with the improper management of wastes during the construction and operational phases includes generation of methane gas (which is explosive and contributes to greenhouse gas emissions), sub-surface soil contamination by the leachate, chemicals etc. and, attraction of vermin. The brine from the desalination plant may potentially result in localized ecosystem changes for aquatic animals in the Manda Bay near the circulating water discharge.

6.2.15 Potential erosion impacts: Erosion of soils during the construction phase could result in sedimentation of water bodies.

7. OTHER POTENTIAL SOCIAL IMPACTS

Other envisaged potential negative social impacts include:

- Increase in traffic disruptions during construction phase as a result of diversions and poor maintenance of the diversions within construction areas of Hindi and Mokowe.
- Immigration into the area during and after the development of the coal fired power plant, pushing up land values with possible buying out of the residents due to higher demand for land. LAPESSET projects, including the Lamu coal fired power plant are expected to attract huge migrant population estimated to be over one million. This will certainly overstretch the county’s social services necessitating commensurate development planning for adequate service provision. Disruption in culture and lifestyles particularly among the Awer and the Bajuni communities.
- Possible spread of diseases such as HIV/AIDS and other lifestyle related deficiencies.
- Potential impacts on public health - Potential impacts associated with public health include untreated air emissions from the power plant chimney, sub-surface soil and groundwater contamination from the ash yard, increase in vector borne diseases such as cholera and typhoid arising from lack of adequate sanitation facilities, etc.
- Potential impacts on security - The potential population influx may result in security concerns such as an increase in crime. Crime levels are typically associated with problems of overcrowding, poverty, poor infrastructure, community dislocation and urbanization, among others. The combined effects of population increase, strain on the already poor infrastructure, poverty, community dislocation and urbanization may potentially lead to an increase in crime.
- Potential impacts on gender - Relative to men, women within the Lamu community have less access to productive assets and services such as land, technology and financing. Access to affordable energy services is an essential prerequisite for achieving economic growth and poverty reduction and can make a significant difference in women’s lives in terms of their health, time use, education and income generation. It is therefore vital to include gender mainstreaming into the proposed Project’s frameworks by continually collecting gender disaggregated data and to use this data to adjust project planning, develop appropriate control measures and evaluate project outputs and potential impacts.
- Potential impacts on movable and immovable archeological finds - Although no artefacts or features were found on the surface during the field survey, there is probability that they could be found buried in the ground during the construction phase. This conclusion is based on the fact that a few archaeological sites are found around the proposed development area, some of which the team visited. There are also reports of archaeological objects being exposed when local residents in the Kwasasi area dig foundations to construct new houses. It is known that there are
archaeological ruins all along this part of the Kenya coastline, though some of them have not been discovered or recorded because they are completely buried.

- **Potential impacts on graves and shrines** - Graves and shrines though not identified within the project area, can possibly be found in the area because the coastline has been continuously occupied for more than a millennium. As such, both recent and early graves might surface during the construction phase. Presence of *mwongo* tree will be a good indicator of a recent grave since all the communities living here identified this tree as symbolic for graves.

- **Potential Impacts associated with World Heritage Site (WHS) Outstanding Universal Value (OUV)** - One of the Lamu OUV is its position as a center for Kiswahili language. This draws people from all over the world to come and learn the language from the owners. Change of population character and integration of other languages into the Swahili language may introduce language changes as the new immigrants socially and culturally impact on the peoples of Lamu.

### 8.0 MITIGATION MEASURES FOR POTENTIAL ENVIRONMENTAL IMPACTS

The project will adopt environmental best practices to minimise impact on the environment and the ESMP has proposed mitigation to ensure minimal residual E&S impacts.

#### 8.1 Climate mitigation:

With regard to climate change implications, the project will use super-critical heating of pulverised coal to ensure highest efficiency in burning coal hence reducing GHG emissions that are otherwise typical of coal power plant without GHG emission reduction measures. This will in part be achieved through installation a wet Limestone Flue Gas Desulphurization (FGD) System to reduce Sulphur Dioxide emissions, Low Nitrous Oxide Burners will be used in combustion to reduce Nitrous Oxide emissions. The sponsor also plans to establish an afforestation campaign in conjunction with Kenya Forestry Research Institute (KEFRI) to plant 1 million trees that will contribute towards carbon sequestration and offsetting carbon emissions.

#### 8.2 Noise Impacts:

For noise impacts, it is expected that the construction noise threshold of 65 dB(A) will be met within a radius of approximately 50 - 75 m from the edge of the construction site. Secondary and thermal glazing should be considered in the design of the dormitory and worker camp accommodation buildings respectively if it is determined from an operational phase noise level survey that the noise levels indeed exceed night-time noise level guidelines.

Other mitigation measures for noise prevention and control include the following:

a) Where possible, noisy construction activities be restricted to the daytime period only, including blasting and pile driving where required for the project infrastructure foundations,

b) Stockpiles of overburden may be used between the construction activities on-site and off-site receptors, where the opportunity exists to provide shielding,

c) Use of mufflers on noisy process equipment, and enclosure of pump rooms, engine rooms.

d) Use of ear muffs for workers at work place

#### 8.3 Surface and Ground water pollution:

To address pollution from the ash dump, the project will ensure that the ash yard foundation is made of impermeable materials including adequately designed and engineered retainer walls to prevent any leachate from entering the sub-surface and groundwater, as well as incorporation of a 1.5m thick in-situ compacted clay layer over which an impermeable liner will be laid and a 0.15m thick sand bed provided. Ground and surface water pollution will further be mitigated through ensuring that contaminated process and oily water is contained and properly pretreated prior to discharge into the environment. The ash yard will contain several groundwater monitoring wells for sampling and analysis of groundwater internally as well as through external National Environment Management Authority (NEMA) accredited laboratories. The leachate will be treated in the industrial wastewater treatment plant to be installed for the project.
Best practice soil erosion measures (silt traps, silt fences etc.) will be used to avoid sedimentation of water bodies. During the construction phase, the EPC Contractor will construct an effluent treatment plant for managing liquid wastes. For oily wastes, the EPC Contractor will construct an adequately sized Oil Water Separator (OWS).

Any hazardous and non-hazardous wastes generated will be managed in compliance with the Kenya waste management regulations and strictly no indiscriminate disposal practices will be tolerated.

**8.4 Air quality**: Technologies to mitigate sulfur oxides (SO\(_x\)), oxides of nitrogen (NO\(_x\)) and particulate matter (PM\(_{10}\) and PM\(_{2.5}\)) emissions have been incorporated into the project design, including but not limited to: the use of dust suppressants during the construction and operational phases, low NO\(_x\) burners to manage the NO\(_x\) emissions, high efficiency Electrostatic Dust Precipitators (ESP\(_s\)) to remove particulate material will also be installed for managing the PM\(_{10}\) and PM\(_{2.5}\) emissions, Wet Flue Gas Desulfurization (FGD) for managing SO\(_x\) emissions and, continuous emission monitoring system (CEMS) installed on the stack. For each of these technologies, the project developer has performance guarantees from the EPC Contractor on the performance efficiency and efficacy which will be monitored through the CEMS.

**8.5 Thermal effluent**
The mitigation measure which the EPC Contractor will incorporate in their detailed engineering design includes the following:

- A 600m long steel pipe emanating from the condenser and having a diameter of \(\sim 2.6\)m which will be buried in the sea bed;
- The last 50m of the steel pipe will have a diffuser with 20 ports on it each having a diameter of 0.58m; and
- The height of each port will be 1m with the first 0.5m being vertical and the next 0.5m welded at an angle of 45\(^0\). Section 8.4 of the ESIA Study discusses the thermal plume modelling study in more detail.

**8.6 Waste management**: A waste management plan will include minimization of waste generation, transport, disposal, and monitoring. The main activities to be introduced as a way of managing the waste will be through reduction, recycling and reusing waste. Any hazardous and non-hazardous wastes generated will be managed in compliance with the Kenya waste management regulations and strictly no indiscriminate disposal practices will be tolerated. All hazardous wastes will be transported by NEMA licensed road transporters for onward disposal to a NEMA approved site.

**8.8 Biodiversity**: Impacts to terrestrial and marine populations of species at risk will be mitigated with standard construction practices and scheduling of project components (e.g. clearing only those areas of the project footprint that are required for construction purposes). Additionally, an alien invasive species (AIS) management plan will be implemented by the EPC Contractor during the construction phase. Mitigation measures for the seawater cooling intake will include barriers and fish screens to minimize impingement and entrainment of fish.

**9.0 MITIGATION MEASURES FOR POTENTIAL SOCIAL IMPACTS**

**9.2 For noise impacts**, it is expected that the construction noise threshold of 65 dB(A) will be met within a radius of approximately 50 - 75 m from the edge of the construction site. Secondary and thermal glazing will be considered in the design of the dormitory and worker camp accommodation buildings respectively if it is determined from an operational phase noise level survey that the noise levels exceed the IFC night-time noise level guideline.

**9.3 Cultural heritage**: To address the concerns for loss of cultural heritage, a Cultural Heritage Impact Assessment has been prepared and recommended creation of a cultural awareness programs to avoid practices that will induce conflicting cultural practices with local people living in the project area and beyond.
For below surface cultural archeological artifacts that could be exposed during construction, it is recommended that Contractors pay due attention to ensure recovery of any artifacts uncovered during the construction phase. For any such chance finds, it is recommended that a procedure be implemented during the construction phase and in the event that any cultural heritage is discovered, the EPC contractor should immediately notify the National Museums of Kenya for an expert opinion.

9.4 Land acquisition and involuntary resettlement
As a mitigation measure a Resettlement Action Plan (RAP) will be developed and implemented by the Ministry of Energy and Petroleum (MoEP) in compliance with the Kenyan legislation and AfDB Operational Safeguard 2 on Land acquisition and involuntary resettlement.

9.5 Disruption and loss of livelihoods
The EPC contractor will avoid contamination of and destruction of fish landing sites during construction of the power plant and associated infrastructure; develop and implement a transparent recruitment plan for employment and business opportunities for the local community and implement a capacity building program for the local communities. The MoEP will develop and implement an AfDB compliant Resettlement Assistance Program (RAP) for project affected persons. To mitigate loss of tourism-related livelihoods, the design of the power plant facilities will seek to minimize loss of existing aesthetic and visual quality and reduce the impact or disruption of activities at tourism and recreational areas / facilities.

9.6 In migration of workers
The project site will be fenced with security provided on a 24/7 basis; the construction phase project camp site will be located within the fenced area and there will be only one access into and out of the project site. APCL will work with the Lamu County Government and LAPSSSET Corridor Development Authority (LCDA) to support the development of spatial planning and resource allocation for land use in the vicinity of the project site, APCL will develop and implement a workforce recruitment policy which will include workforce targets, prioritization, the location and use of local recruitment centers.

9.7 Increased pressure on existing infrastructure and social amenities
The EPC contractor and project developer will consult with relevant agencies on the current and future infrastructural development plans for the County and consider providing housing facilities for all construction workers and if this is not possible make plans to transport workers daily to and from Mokowe and Hindi to the project site using buses. The EPC contractor will provide adequate infrastructure for water supply, waste management, health facilities, schools, etc. so as not to strain the existing County resources. In order to manage traffic the EPC contractor will develop and implement a traffic management plan which will be strictly enforced.

9.8 Public health and safety
The EPC Contractor will provide sanitation guidelines in the contracts for companies who are responsible for the construction and operation of temporary housing and mobile construction camps, undertake initial medical and health screening programs, develop and implement an HIV/AIDS peer educator program throughout the construction and operational phase, ensure the diesel powered equipment are regularly serviced and the diesel quality standards for the Sulphur content comply with local regulations for on road vehicles, develop a dust management and monitoring plan to manage and control dust emissions, develop a Construction Management Plan (CMP), comply with the Kenyan Waste Management Regulations and effluent discharge standards, comply with IFC EHS Guidelines for Thermal Plants. APCL will develop and implement an Air Quality Monitoring Plan for pollutants of concern such as PM$_{10}$, NO$_x$, SO$_x$ and undertake annual stack testing for metals during the operation phase, implement a continuous ambient air quality monitoring system and also an operation dust management and monitoring plan to control and manage dust emissions from coal and ash handling during the operation phase. High Efficiency Electrostatic Dust Precipitators (ESP) to remove particulate material will also be installed to protect workers against dust exposure.
9.9 Occupational safety and health
In order to manage the potential Occupational Safety and Health (OSH) aspects and impacts during the construction phase, the EPC Contractor’s Construction Environment Management Plan (CEMP) will include a comprehensive OSH management plan. The CEMP will be designed in accordance with the requirements of ISO 31000 (Risk Management Standard) and ISO 45000 (OSH Management Standard) and will be a precondition prior to the commencement of any construction works on site. The EPC Contractor will regularly update their CEMP based on a thorough and comprehensive OSH risk management framework that must be deployed throughout the construction phase. As required under Section 6(3) of Kenya’s Occupational Safety and Health Act, 2007 (OSHA), the EPC Contractor will carry out a formal and appropriate OSH risk assessments of the project construction phase and submit a report to the nearest Directorate of Occupational Safety and Health Services (DOSHS) OSH Officer annually. To manage community health and safety issues, the EPC Contractor will develop and implement an Emergency Response Plan (ERP) for all on-site and off-site emergencies. The ERP must be developed based on a formal emergency response risk assessment of credible emergency scenarios.

9.10 Traffic and related incidents
As a mitigation measure, APCL and its contractors will undertake a risk management appraisal of their road transport carriers, develop a Traffic management plan for both the construction and operational phase, implement dust suppression measures for heavy vehicles such as wetting of murram roads on a regular basis, prepare detailed plan for signage in and around the power plant to facilitate traffic movement, provide directions and safety advice, as well as warnings and advance public awareness programs to identify areas of particular risk and approaches to reduce risk.

9.11 Security
As a mitigation measure, the EPC contractor will ensure construction workers are clearly identifiable, the construction site and construction camp will be fenced and access will be controlled by means of a security access control system, loitering of outsiders at either the construction site or at the construction village will not be allowed and unsocial activities such as consumption or selling of alcohol, drug utilization or selling and prostitution on site will be prohibited.

9.12 Labour and working conditions
As a mitigation measure the O&M Company will develop and implement a human resource (HR) management system, and put in place a Personnel Database and Records Systems, the O&M Company will identify child labor / forced labor issues in the operations chain and take appropriate steps. APCL will ensure proper documentation of employment contracts, cooperation between employers and workers’ organizations, provide training to human resources staff and key personnel involved in activities related to employment, recruitment and labor management, including relevant managers, supervisors and recruitment officers, establish an employee grievance mechanism, put in place an elaborate, efficient and well-resourced human resource department, ensure contracts of employment will be in writing for both permanent and contracted employees and develop HR policy and procedures

9.13 Movable and immovable archeological finds
APCL will develop and implement a Chance Finds Procedure (CFP) which all contractors must be comply with. In the event of archaeological materials appearing during any construction related activities, work will stop immediately and a qualified NMK scientist engaged to advice on the way forward. Throughout the construction phase, APCL will engage archaeologists and cultural heritage experts to offer watching brief and oversight.

9.14 Graves and shrines
As a mitigation measure, APCL and its contractors will undertake construction works carefully especially around the areas with mwongo trees for any visible signs of human bones. Where bones appear in the course of any construction works on site, work will stop and a qualified scientist from the NMK will be engaged to identify and advise the contractor on the way forward. In the event of such an
occurrence, the service contractor must engage the Kwasasi Elders to undertake the necessary rituals to relocate the human bones and accord a proper burial at a new location.

9.15 Cultural landscape and sense of place
As a mitigation measure, APCL and its service contractors will limit height and density of the planed buildings to harmonize the visual impact on cultural landscape, ensure that buildings are designed in such a way that the architecture resembles Swahili houses and painted a similar colour in order to blend in with the surroundings. APCL and its service contractors will also build vegetation buffer zones, including planting of trees within and in-between various service contractors work areas and only cut down vegetation and trees where their respective footprints are planned.

9.16 Loss of plants of cultural value
As a mitigation measure, wherever medicinal trees and wild fruit plants are to be cut down within the project area, APCL and its service contractors will offset such trees and plants outside the project area.

9.17 Impacts associated with WHS OUV
As a mitigation measure APCL will build a flexible program that allows time for its workers to participate in the cultural festivals, allow time for Muslim faithful to attend prayers and other religious activities as required by Islamic faith in order to maintain the religious component of the OUV, encourage preparation and serving of local traditional dishes within its restaurants, have an induction program that introduces its workers to the traditional cultures of Lamu and where necessary promote the Swahili learning institutions within the Island and impose a dress code to its workers (outside the PPE) and people doing businesses around the coal plant to maintain the cultural values and, which is not offensive to Lamu residents.
### 10.0 ESMP Highlighting Summary of mitigation of negative environmental and social impacts, in addition to those highlighted above

<table>
<thead>
<tr>
<th>Potential impacts</th>
<th>Management: Action/Control</th>
<th>Monitoring Frequency</th>
<th>Responsibility</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Potential impacts on land acquisition and involuntary resettlement</strong></td>
<td>- Implement a RAP that complies with Kenyan legislation, and African Development Bank’s Operational Safeguard 2 on Land Acquisition and Involuntary Resettlement</td>
<td>Annual review of the RAP report</td>
<td>Government of Kenya (MoEP and NLC)</td>
<td>Before construction commences</td>
</tr>
<tr>
<td></td>
<td>- Ensure full disclosure, consultation and meaningful engagement of the PAPs throughout the resettlement process (including the host communities)</td>
<td>Six-monthly review of stakeholder engagement reports</td>
<td>Government of Kenya (MoEP and NLC)</td>
<td>Before construction and throughout project lifecycle</td>
</tr>
<tr>
<td></td>
<td>- Develop and implement a compensation plan for displaced and relocated people.</td>
<td>Annual review of RAP stakeholder engagement reports.</td>
<td>Government of Kenya (NLC)</td>
<td>Before construction and reviewed during construction</td>
</tr>
<tr>
<td></td>
<td>- Ensure new locations are culturally and commercially compatible with the proposed project site</td>
<td>Annual review of RAP compensation plans</td>
<td>Government of Kenya (NLC)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Provide counselling services for the PAPs for adaptation to the new surroundings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Provide financial literacy training for PAPs for sustainable management of the funds</td>
<td>Annual review of the RAP report</td>
<td>Government of Kenya (NLC)</td>
<td>Before &amp; during the construction phase</td>
</tr>
<tr>
<td><strong>Potential impacts on disruption and loss of livelihood</strong></td>
<td>- Implement the Resettlement Action Plan (RAP) in line with the National land policy (2009), and international best practice.</td>
<td>Periodic review of the RAP report</td>
<td>Government of Kenya (National Land Commission-NLC)</td>
<td>Before &amp; during the construction phase</td>
</tr>
<tr>
<td></td>
<td>- Ensure women are consulted especially during disbursement of compensation to bridge any existing gender inequalities and vulnerabilities arising from payments made to PAPs</td>
<td>Periodic review and update of the RAP compensation and benefits framework</td>
<td>Government of Kenya (NLC)</td>
<td>Before construction commences</td>
</tr>
<tr>
<td></td>
<td>- Provide financial management training to the PAPs to be able to manage compensation funds sustainably</td>
<td>Annual progress monitoring of PAPs</td>
<td>Government of Kenya (NLC)</td>
<td>Before &amp; during the construction phase</td>
</tr>
<tr>
<td></td>
<td>- Where qualified personnel are available within the local community, the EPC Contractor and O&amp;M Company will prioritize employment opportunities from members of the local community</td>
<td>Quarterly, six-monthly and annual review of employment procedures and records</td>
<td>EPC contractor for construction phase, O&amp;M Company for operations phase</td>
<td>During construction &amp; operational phase and monitored throughout the project lifecycle</td>
</tr>
<tr>
<td></td>
<td>- CSR programme will include efforts to support improvement of the tourism industry such as conservation of the forests, creation of recreation parks, preservation of heritage sites, etc.</td>
<td>Annual review of the CSR programme activities and reports</td>
<td>O&amp;M Company for operations phase</td>
<td>Throughout the project cycle</td>
</tr>
<tr>
<td>Potential impacts</td>
<td>Management: Action/Control</td>
<td>Monitoring Frequency</td>
<td>Responsibility</td>
<td>Timeframe</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------------</td>
<td>----------------------</td>
<td>----------------</td>
<td>-----------</td>
</tr>
<tr>
<td><strong>Potential impacts on fishing industry</strong></td>
<td>To mitigate impacts on fishing industry, the EPC Contractor and O&amp;M Company will not discharge raw effluent into the Manda bay which could adversely impact fisheries</td>
<td>Daily testing of treated effluent prior to discharge Periodic maintenance of Wastewater Treatment Plant</td>
<td>EPC contractor for construction phase, O&amp;M Company for operations phase</td>
<td>Throughout the project cycle</td>
</tr>
<tr>
<td><strong>Potential impacts on In-migration of workers</strong></td>
<td>Develop and implement a transparent recruitment process prioritizing the local community and communicate the same through the local administration/ Chiefs’ office</td>
<td>Quarterly, six-monthly and annual review of employment procedures</td>
<td>EPC Contractor for construction phase, O&amp;M Company in the operational phase</td>
<td>Before construction phase commences, and throughout the project lifecycle</td>
</tr>
<tr>
<td></td>
<td>Develop and implement camp and workforce management protocols which are clearly communicated to the workforce.</td>
<td>Six-monthly and annual review of employment procedures</td>
<td>EPC Contractor for construction phase O&amp;M Company</td>
<td>Before construction and throughout the project lifecycle</td>
</tr>
<tr>
<td></td>
<td>Identify and facilitate training opportunities with vocational training institutions such as the Lamu Polytechnic for the local workforce to participate in other job sectors</td>
<td>Annual review of training reports/records</td>
<td>EPC Contractor for construction phase O&amp;M Company in the operational phase</td>
<td>During construction and review it throughout the project lifecycle</td>
</tr>
<tr>
<td><strong>Potential impacts on existing infrastructure and social amenities</strong></td>
<td>Consult with local and national Government and non-governmental agencies on the current and future infrastructural development plans for the County with a view of supplementing their implementation</td>
<td>Quarterly and annual review of the infrastructural development reports</td>
<td>EPC Contractor for construction phase, O&amp;M Company in the operational phase</td>
<td>During construction and review it throughout the project lifecycle</td>
</tr>
<tr>
<td></td>
<td>Providing housing facilities for all construction workers and/or make arrangements for workers’ transportation to and from project sites.</td>
<td>Annual review of the housing plan</td>
<td>EPC Contractor for construction phase, O&amp;M Company</td>
<td>Before construction and throughout the project lifecycle</td>
</tr>
<tr>
<td></td>
<td>Endeavour to provide to company staff adequate infrastructure for water supply, waste management, health facilities, schools, etc.</td>
<td>Annual review of the infrastructural development reports</td>
<td>EPC Contractor for construction phase, and O&amp;M Company</td>
<td>Throughout the project life cycle</td>
</tr>
<tr>
<td><strong>Potential impacts on public health and safety</strong></td>
<td>Develop a Construction Management Plan (CMP) and sub-plans outlining procedures for management of Air quality, Dust emission, waste disposal and Sanitation, Camp management, HIV/AIDS policy, Malaria management and other communicable diseases</td>
<td>Six monthly review of the outlined sub plans of the CMP</td>
<td>EPC Contractor for construction phase, O&amp;M Company in the operational phase</td>
<td>Before construction commences and implemented during the construction phase</td>
</tr>
<tr>
<td></td>
<td>Undertake Occupational health program to include: medical health screening to detect workers with active respiratory diseases, and surveillance programs throughout the project.</td>
<td>Annual review of the occupational health plan</td>
<td>EPC Contractor for construction phase, O&amp;M Company in the operational phase</td>
<td>Throughout the project life cycle</td>
</tr>
<tr>
<td>Potential impacts</td>
<td>Management: Action/Control</td>
<td>Monitoring Frequency</td>
<td>Responsibility</td>
<td>Timeframe</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------</td>
<td>----------------------</td>
<td>---------------</td>
<td>-----------</td>
</tr>
</tbody>
</table>
| Potential impacts on occupational health and safety | • Develop and implement an Occupational Safety and Health (OSH) Management System (Occupational Health and Safety Act of 2007 and its subsidiary regulations), OHSAS 18001 and the IFC General EHS Guidelines and will outline OSH procedures  
• Provision of OSH orientation training to all employees and periodic safety inspections;  
• Development of a worker safety programme; Employment health and safety personnel | Annual review of the Occupational Safety and Health (OSH) Management System | EPC Contractor for construction phase, O&M Company in the operational phase | Throughout the project life cycle |
| Potential impacts on traffic and related incidents | • Develop a Traffic Management Plan (TMP) for construction and operational phases. The TMP shall include procedures for transportation of abnormal loads, dust suppression measures, regular inspection of access roads conditions and signage at construction areas. | Six monthly review of the Transport Management Plan | EPC Contractor for construction phase, O&M Company in the operational phase | Before construction commences and throughout the project life cycle |
| Potential impacts on security | • Develop a security management plan encompassing Controlled access and exit from the construction site, established screening at the security check points and formal identification system for construction workers.  
• Develop guidelines for social conduct in and around the construction site and when interacting with community and complying with national laws regarding drugs and substance abuse including alcohol and prostitution. | Six-monthly review of the security management plan  
Six-monthly review of the social conduct guidelines | EPC Contractor for construction phase, O&M Company in the operational phase | Throughout the project life cycle |
| Potential impacts due to labour and working conditions | • Develop and implement a documented HR management system and plan with the specific procedures: conditions and terms of employment (contracts and agreements, employment and labor conditions, hiring and layoff), workplace non- discrimination, child/ forced labor policies, guidelines for drug and alcohol use, HIV/AIDS and other health risk-related activities  
• Communicate the Camp management plan to the local communities especially the rules governing workers camps, worker-community interaction regulations and the consequences of workers breaking such rules. | Annual review of the HRM plan  
Annual review of the camp management plan and communication program | EPC Contractor for construction phase, O&M Company in the operational phase | Before construction and review it throughout the project life cycle |
<p>| | | | | |
| | | | | |</p>
<table>
<thead>
<tr>
<th>Potential impacts</th>
<th>Management: Action/Control</th>
<th>Monitoring Frequency</th>
<th>Responsibility</th>
<th>Timeframe</th>
</tr>
</thead>
</table>
| **Potential impacts on movable archaeological finds** | • Develop and implement a chance finds management procedure to be complied with by all contractors engaged at the coal power plant site  
• Include chance finds procedure in contract documents  
• Engaging a qualified scientist from National Museums of Kenya (NMK) during the construction to offer advise during construction phase | Monthly review of the chance find procedure put in place in relation to movable archaeological finds | APCL and EPC Contractor for construction phase | Before and during the construction phase |
| **Potential impacts on immovable archaeological finds** | • Institute a watch brief to for all excavation activities.  
• Develop and implement a chance finds procedure which must be incorporated into contract documents for all Contractors who will undertake construction works.  
• Undertake construction works carefully in areas with mwongo trees for any visible signs of human remains.  
• Where human remains appear in the course of any excavations, work should stop and a qualified scientist from the NMK engaged to advise on the way forward.  
• Engaging the Kwasasi Elders in case of any relocation of human bones found during construction | Monthly review of the watch briefing reports and chance find procedure put in place in relation to immovable archaeological finds | EPC Contractor for construction phase | Before and during the construction phase |
| **Potential impacts on graves and shrines** | • Undertaking construction works carefully especially around the areas with mwongo trees for any visible signs of human remains.  
• Where human remains are found during construction, work should stop and a qualified scientist from the NMK engaged to identify and advise the contractor on the way forward  
• Engaging Kwasasi Elders in case of any relocation relocate of human bones found during construction | Monthly review of the watch briefing reports and chance find procedures, Review of the consultation meetings held with the Kwasasi elders | EPC Contractor for construction phase | Before and during the construction phase |

The costs for implementing these actions in the ESMP will be included by the EPC contractor, once detailed costs have been established.
11.0 Monitoring program

The monitoring plan will include both internal and external monitoring. This will comprise of a three-tier process that will include internal field monitoring by the Resident Supervising Consultant (RSC) and the Project Implementation Unit (PIU). The Monitoring program shall also include monthly audits by the Environmental Control Officer. The monitoring program shall focus on early detections of deviations from expected performance and early institution of remedial measures. The AfDB will conduct regular supervision mission to ensure compliance to various ESIA covenants.

Public consultation and public disclosure

APCL is committed to effective and open consultation to ensure that potentially affected members of the public are fully aware of the project and have the opportunity to make their views known. The activities that have been conducted as part of public stakeholder consultations and as part of the ESIA process have included:

- Presentation of the proposed project to various stakeholders including the County Government of Lamu, County Assembly of Lamu and civil society groups based in Lamu on various dates between January 2015 and June 2016;
- Hosting public stakeholder consultation meetings at the project site and surrounding areas to engage the communities and PAPs on potential environmental and social issues.

The key issues raised by the public include: Economic issues (employment, economic benefits, etc.); Ecological issues (impacts on terrestrial ecology); Water and soil issues (pollution of soil and water resources, soil erosion, etc.); Air and noise pollution (during the construction and operational phase); Health, safety and security arising from the operation of the new project; and Social issues (conflicts over job opportunities, disruption of livelihoods and services, cultural changes, etc.).

Consultation of key stakeholders was also part of the process for gathering information on areas that required local knowledge. For instance, in order to carry out coastal wetlands and marine ecological assessment, a general survey was conducted for the entire footprint area of the coal power plant to assess the presence and distribution of coastal wetlands and marine critical habitats, and this was done with the help of key informants’ who provided important local ecological information on distribution and abundances of species and habitats. Key informants included chairmen of mangrove cutter associations, Beach Management Units (BMU), local leaders and administrators.

As part of the ESIA study, a public/stakeholder consultation program was undertaken and focused on engaging community residents, businesses, local/public authorities, community leaders, County Government as well as other individuals or groups that expressed an interest in the project. The publicity of the stakeholder meetings was done through APCL CLOs, local elders, public notice posters, and formal invitation letters. A combination of various information and consultation methods was used. These included key informant consultations, meetings with the public and media activities. NEMA also sent out a public notice giving details about the project and the ESIA process in a local daily called Taifa Leo as well as in the Daily Nation newspaper on 25th July 2016 providing to the public information about the project before subsequently issuing approval for the project on 7th September 2016.

Stakeholder consultation is an ongoing process and consultations will be undertaken as the project progresses. Minutes of meetings held and digital photographs taken during the meetings are appended in the Social Impact Assessment and captured in the ESIA’s Stakeholder Engagement Plan.

Grievance Mechanism: For all Category A projects, the developer is required to establish a grievance mechanism designed to receive and facilitate resolution of community concerns and grievances about the Project’s environmental and social performance. The grievance mechanism will be monitored during the construction and operational phases of the project.

Disclosure of Information:
APCL has consistently been transparent about the entire ESIA Study process and has updated the communities in the Study area about the project and its potential environmental and social (E&S) impacts. APCL has disclosed the findings of the scoping study, baseline studies and other specialist studies in full compliance with Kenyan regulatory requirements. The disclosure process has been formal with minutes of meetings and issues addressed in the ESIA Study disclosed.

The full ESIA draft has been circulated in the Project area and has been accessible on the Amu Power website since July 2016 (see https://www.amupower.co.ke/esia.html).

**Institutional capacities and strengthening plan**

The proposed coal power plant will require the implementation of the ESMP developed as part of this ESIA Study. The accountability for this ESIA Study and the ESMP lies with the project development company, Amu Power Company Limited (APCL). Subsequently, APCL will ensure that contractually, it cascades the requirements for implementing the ESMP to the EPC Contractor (for the construction phase) and the O&M Company (for the operational phase) of the project.

APCL through the EPC Contractor (during the construction phase) and O&M Company (during the operational phase), will build the institutional capacity necessary to develop and implement their corporate ESMS based on the requirements of the AfDB’s Integrated Safeguards System (ISS).

Given below is a summary of the existing institutional capacity of various actors for implementing the ESMP associated with this project and the recommended strengthening plan.

**Amu Power Company Ltd.**

Amu Power Company Ltd. (APCL) is a Special Purpose Vehicle (SPV) that was awarded the contract by the Ministry of Energy and Petroleum to Build Own and Operate the 1,050MW coal fired power plant in Lamu. They are in the process of building institutional capacity to implement the recommendations contained in this ESIA Study (and the associated Specialists Studies). As part of the process, APCL will hire a Corporate Environmental and Social (E&S) Manager who will be responsible for overseeing the implementation of the ESIA Study mitigation measures, ESMP and E&S monitoring plan during the construction and operational phases.

The E&S roles, responsibilities and accountabilities of each person within APCL’s organization structure will be documented in a Job Description which will be used during the appraisal process. The senior leadership team (SLT) will demonstrate their commitment to the ESMS by providing the resources for implementing their corporate wide ESMS. The SLT will also hold the EPC Contractor accountable for implementing the Construction Environment Management Plan (CEMP) in the construction phase. Similarly, APCL will hold the O&M Company accountable for the development and implementation of a recognized and AfDB compliant ESMS during the operational phase.

APCL will coordinate the provision and enforcement of relevant training to its staff on the E&S requirements of Multilateral Finance Institutions (MFIs) such as the AfDB such as the Integrated Safeguards System and its importance throughout the construction and operational phases of the project. APCL will further provide this training to the EPC Contractor and their staff at the outset of the project.

**Project Management Consultant**

It is envisaged that APCL will be engaging the services of a Project Management Consultant (PMC) to supervise the EPC Contractor. The PMC will have their own E&S staff compliment which will need to among other things, supervise the EPC Contractor on the ESMP implementation during the construction phase of the project.

The PMC will provide appropriate E&S training to their staff as well as of the EPC Contractor on a needs basis.
EPC Contractor
The EPC Contractor is responsible for developing a documented Construction Environment Management Plan (CEMP) and associated sub-plans such as a transport management plan, emergency response plan, waste management plan, alien invasive species management plan and so on. The EPC Contractor will therefore need to have in-house Environmental and social expertise to oversee day-to-day implementation of the ESMP. The EPC Contractor will provide accurate monthly E&S reporting (including statistics) to APCL for trending.

Conclusion
The overall conclusion of the ESIA Study is that if the mitigation measures highlighted above are implemented, it is possible to implement the proposed 1,050MW coal fired power plant having minimal negative impact on the biophysical and social environment. A number of impacts are short-term and of a temporary nature and can be readily addressed. Additionally, the implementation of the ESMP, Stakeholder Engagement Plan (SEP) and Grievance Mechanism (GM) will support APCLs efforts in ensuring sound implementation of the project.

This ESIA/RAP summary was prepared based on information contained in the detailed project ESIA and RAP documents. For further information please contact:

Task Managers:
Jasmin Jakoet, African Development Bank, Abidjan. E-mail: JJAKOET@AFDB.ORG
Alli Mukasa, African Development Bank, Abidjan. E-mail: AMUKASA@AFDB.ORG

Justin Ecaat, African Development Bank, Regional Directorate, East Africa, Nairobi Kenya, Tel: +254 20 2998245, e-mail: JECAAF@AFDB.ORG