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## 10 Cumulative Impact Assessment

The IFC Procedure for Environmental and Social Review of Projects (IFC, December 1998) states that environmental assessment should include consideration of:

*"...cumulative impacts of existing projects, the proposed project and anticipated future projects."*

To identify which other projects need to be considered alongside the project being assessed the IFC Procedure states that:

*"Assessment of cumulative impacts would take into account projects or potential developments that are realistically defined at the time the environmental assessment is undertaken, where such projects and developments could impact on the project area".*

Cumulative impacts may result when the environmental effects associated with a proposed project are superimposed on, or added to, either temporary (construction related) or permanent (operation related) impacts associated with past, present, or reasonably foreseeable future projects. Although the individual impact of each separate project may be minor, the additive or synergistic effects of multiple projects could be significant.

This cumulative impact assessment covers past, present and future interactions between the Lamu coal power project and the proposed 220kV overhead transmission line in the same geographical area which will evacuate power from the coal power plant.

### 10.1 Approach taken to assess cumulative impacts

In the sub-sections below, the potential cumulative impacts of other developments within the region are explored (proposed and operational). The discussion and associated conclusions must be understood in the context of the uncertainty associated with the proposed development and the qualitative nature of the assessment.

In theory, it is expected that the construction of the proposed overhead transmission line will occur at the same time as the Lamu coal power project. Consequently, construction of the overhead transmission line in the vicinity of the coal power plant could potentially cause impacts to the same receptors such that there will be cumulative impacts associated with the coal power plant.

Prior to assessing cumulative impacts, consultations were held with the LAPSSET Authority, County Government of Lamu and Kenya Ports Authority to establish whether there are any projects that are currently under construction or firmly committed. The responses indicate that the three institutions envisage developing projects in the vicinity of the proposed coal power project, however the timeline for their development is unknown.

Subsequently, this section considers the potential cumulative impacts arising from the overhead transmission line assuming that its construction will take place concurrently to the coal power plant.

## **10.2 Spatial and temporal boundaries**

The spatial boundaries for this cumulative impact assessment is the immediate area around the Lamu coal power plant and associated transmission line within Lamu County. The assessment of cumulative effects on the natural and social environment therefore includes activities directly and indirectly related to the project.

For the Lamu coal power project, this includes the development of the 1,050MW coal power plant and the development of the overhead transmission line which will evacuate power from the proposed project.

The temporal boundaries of the assessment coincide with the operational life of the project, which is 25 years. The majority of the cumulative effects will occur in the short and medium term, during construction. The coal power plant construction is expected to commence at the end of 2015/beginning of 2016 with the construction period lasting about 42 months.

## **10.3 Assessment of potential cumulative impacts**

Cumulative impacts that could occur due to the development of the proposed 1,050MW coal fired power plant and the associated 400kV overhead transmission line in proximity to other LAPSSSET planned projects include impacts on:

- Air quality
- Noise quality
- Geology and soils
- Water resources
- Biodiversity
- Involuntary resettlement
- Population increase
- Cultural heritage
- Economy and employment
- Community health and safety
- Infrastructure
- Public services
- Transportation and traffic

### **10.3.1 Air quality**

Construction of most of the reasonably foreseeable Vision 2030 future projects and associated activities would involve the use of heavy equipment that would produce air contaminants, and dust. Construction and operation of the proposed coal power plant and overhead transmission line may contribute cumulatively to adverse air quality. These effects could add to the ongoing air and noise impacts in the project area in Hindi/Magogoni sub-county.

The proposed coal power plant and transmission line infrastructure is expected to release dust emissions into the environment during the construction phase. It is expected that grubbing of the easement will be undertaken along the overhead transmission line corridor; concurrently, there will be clearing of vegetation and topsoil at the coal power plant which would potentially cause cumulative impacts.

The cumulative impacts are temporary and will occur during the construction phase of the two projects. The cumulative impact is expected to be low as dust emissions from grubbing along the overhead transmission line will be intermittent and not necessarily synchronized with the clearing at the coal power plant.

Cumulative impact on air quality, therefore, would be limited primarily to areas where more than one project is proposed within the same airshed. Because the proposed LAPSSET projects emanating in Lamu are located over a large area, have varying construction schedules and must adhere to EMCA and its subsidiary legislation for the protection of ambient air quality, cumulative impacts on air quality would have low significance initially but as more projects come on-stream, the significance would be medium.

### **10.3.2 Noise quality**

The existing noise climate in the project area is rural in nature. Lamu County does not have a single factory located within it and there are currently no projects being undertaken within a radius of 5km from the project site. During the construction phase of the coal power plant and overhead transmission line, noise will be generated by construction plant and equipment.

Noise impacts are particularly localized and attenuate quickly as the distance from the noise source increases. Therefore, cumulative noise impacts associated with construction and operation would be unlikely.

A noise modeling assessment was carried out for the construction and operational phases of the coal power plant project. Based on the results of the study, it was established that the noise levels at the fence of the coal power plant plot are less than the IFC guideline values, i.e. less than 70d(B)A.

Subsequently, it is not envisaged that there will be cumulative impacts arising from noise generation during the construction and operational phases of the overhead transmission line and coal power plant respectively.

### **10.3.3 Geology and soils**

Construction of the coal power plant will entail clearing and excavation of soil over an area of about 80 hectares while the excavation for each tower structure of the transmission line will cover an area of about 25m<sup>2</sup>. This will cause changes in the drainage regime and increased erosion potential leading to run-off impacts.

There is a potential of sub-surface soil contamination if fuels used for the construction plant and equipment are not stored safely in using secondary containment methods.

The potential impacts on soils is considered low negative if the mitigation measures for geology and soils recommended in this ESIA Study are complied with.

#### **10.3.4 Water resources**

During the construction phase, there will be about 2000 – 3000 workers that will be involved in the construction of the coal power plant. There will also be several workers involved in the construction of the overhead transmission line. These workers will require clean water for a variety of purposes. Assuming that each worker needs about 200 liters/day of water, the total daily water required for the construction workers is about 600m<sup>3</sup>.

The cumulative impact are related to those associated with disposal of sewage. The workers from the two projects will generate a significant amount of sewage which if untreated could end up adversely affecting the environment. Currently, there is no County sanitation infrastructure within the vicinity of the project area, Hindi or Mokowe that can treat and dispose sewage generated by human activities.

Additionally, there will be significant civil engineering construction works that will require clean water for concrete works associated with the coal power plant and overhead transmission line reinforced concrete foundations. Lamu is a water scarce county and suffers perennial shortage of clean water for a variety of uses. Consequently, the demand for water by both projects will be an adverse cumulative impact on the already poor water situation without mitigation. Additionally, the improper disposal of sewage from the two projects will be an adverse impact without mitigation.

In order to mitigate this impact, the Proponents of the two projects must use water resources efficiently and ensure that they design and implement proper sewage treatment facilities. The effluent from such sewage treatment facilities must comply with the effluent discharge standards set by the NEMA.

#### **10.3.5 Waste**

The project will generate various types of wastes (non-hazardous and hazardous) during the construction and operational phases of the project. If handled, stored and disposed improperly, such wastes could potentially contaminate soil and groundwater resources. This would be a cumulative impact as there are no waste management and disposal facilities currently available in the project area, Hindi or Mokowe.

Wastes include spoil, excess concrete, used timber, general and household refuse, sewage and wastewater, machinery parts and building rubble and small amounts of hazardous wastes such as used oil, oily rags, etc.

#### **10.3.6 Biodiversity**

When projects are constructed at the same time or close to the same time, they would have a cumulative impact on vegetation and wildlife occurring in the area where the projects would be built.

Clearing of vegetation and trees at the coal power plant site, grubbing/construction activities associated with the overhead transmission line project and other LAPSET related projects emanating in Lamu County, etc. would result in the removal of vegetation; alteration of wildlife habitat; displacement of wildlife; and other secondary effects such as increased population stress, predation, and establishment of invasive plant species. These effects would be greatest where other projects are constructed within the same time frame and area as the proposed project.

Another cumulative impact will be the thermal discharge of once through cooling water from the coal power plant. This is a new impact that will be felt and will adversely impact coral reef over a small area where the discharge point will be situated.

The ESIA Study for the Lamu coal power plant has recommended several measures to protect the biodiversity currently found within the project site and its environs. The terrestrial and marine ecology mitigation measures established in the above study should be applied by KETRACO for the overhead transmission line construction in order to minimize adverse biodiversity impacts. All of the foreseeable LAPSSET projects should implement mitigation measures designed to minimize the potential for long-term erosion, increase the stability of site conditions, and in many cases control the spread of noxious weeds, thereby minimizing the degree and duration of the cumulative impacts of these projects.

### **10.3.7 Involuntary resettlement**

The proposed Lamu coal power plant will involve the involuntary resettlement of people currently living and farming on the project site. A resettlement action plan (RAP) will be developed and implemented for the project. The competent authority for implementing the RAP for the coal power plant is the National Land Commission. The RAP is being led by the Ministry of Energy and Petroleum (MoEP) as the client for the project.

The overhead transmission line corridor will require easement agreements between KETRACO and those who own land along a 60m wide easement corridor. A separate RAP has commenced for the overhead transmission line project associated with the proposed coal fired power plant.

The acquisition of land for the coal power project and easement agreements along the easement corridor for the overhead transmission line will result in a loss of vegetation and crops, houses and structures, and agricultural land.

The cumulative impact of the two projects would be loss of agricultural land and revenue from crops planted by farmers. Another cumulative impact arising from the coal power plant and overhead transmission line are the compensation rates paid for land, housing structures, crops and livelihood restoration. It took a long time to agree on the compensation rates paid out to the land owners around the Kililana area and this could resurface at the coal power plant if the National Land Commission does not compensate eligible project affected persons (PAPs) properly.

In order to manage this cumulative impact, the involuntary resettlement should be undertaken strictly in accordance with the AfDB's Operational Safeguard 2 and the IFC's Performance Standard 5 on Land Acquisition and Involuntary Resettlement by the National Land Commission.

### **10.3.8 Population increase**

There will be about 2000 – 3000 workers involved in the construction of the proposed coal power plant. The overhead transmission line will be constructed by a few hundred workers. The majority of these workers will immigrate into the project area from other parts of Kenya and overseas. While the first opportunity for employment for all jobs will be given to the indigenous residents of Lamu County, it is envisaged that there will be demographic changes that will occur.

The cumulative impact would be increased social tension resulting from immigrants (especially males) from other parts of Kenya and overseas. The higher disposable incomes will lead to a cumulative prevalence of immoral behavior leading to an increase in sexually transmitted infections (STIs). This cumulative impact will be felt over an extended area including Lamu town where most of the amenities are currently available.

### 10.3.9 Cultural heritage

The *Boni (Aweer)* and *Sanye* are the few remaining ethnic minorities in Kenya that are traditional hunter gatherers. Over the years these two ethnic minorities have been pushed away from their ancestral lands by farmers from Pate Island towards the Boni forest. According to the Boni, their grave sites were previously identified by planting a *Mwongo* tree near such sites.

The cumulative impact is the identification of the number of *Mwongo* trees cited within the project footprint area and along the easement of the overhead transmission line. This should be followed by following appropriate cultural practices for relocation of the confirmed burial sites.

### 10.3.10 Economy and employment

The proposed coal power plant and overhead transmission line will employ between 2000 and 3000 people directly during the construction phase and about 250 – 300 people during the operational phase. While there is no rule of thumb, it is estimated that 30 percent of the construction workforce would be local hires. If the larger LAPSSSET projects such as the crude oil pipeline, major road and rail development projects are built simultaneously, the demand for workers could exceed the local supply of appropriately skilled labor. Therefore, if these projects are constructed at the same time, the demand for local workers may exceed supply. It is assumed that the remainder of the employment positions would be filled by non-local hires.

The cumulative impact arising from the above is that there will be a strain on the educational facilities to provide about 30% of the labor force for the coal power plant and overhead transmission line projects in addition to the other potential LAPSSSET related projects. Additional potential positive cumulative impacts of these projects include an increase in tax revenue for the Lamu County Government, Central Government and other local economies through the payment of payroll tax, sales tax, property tax, and other taxes and fees.

### 10.3.11 Community health and safety

The proposed coal power plant will be designed to the highest standards of health, safety and environment (HSE). Industrial undertakings must continue to manage any potential HSE hazards and risks that could arise from the construction and operational phases of the project. HSE related risks are cumulative impacts that may be introduced during the construction and operational phase of the project. Such risks that potentially poses community health and safety risks include major fires, explosions from flammable liquid storage, traffic hazards, etc. The 400kV overhead transmission line potentially poses electro-magnetic frequency (EMF) hazards during the operational phase.

The above are potential cumulative impacts that could arise as a result of the two projects.

### **10.3.12 Infrastructure**

As mentioned previously, the coal power plant will require about 2000 – 3000 workers during the construction phase and about 250 – 300 workers during the operational phase. This community will require a number of infrastructure related projects such as schools, medical facilities, shopping centers, housing, water, electricity, telecommunications, etc.

The enhanced positive cumulative impact is that as part of their CSR program, Amu Power will be investing in upgrading local roads, building a school, a medical facility, ambulances, provision of clean water from the desalination plant to the community, etc.

### **10.3.13 Public services**

Currently the population around the Hindi/Magogoni sub-county is sparsely populated and do not have access to public services such as fire service, police, etc. Due to the unstable security situation, armed security escorts are usually required to move from Mokowe to the project area. This armed security is mainly due to potential terrorist threats that exist intermittently in Lamu County.

The positive cumulative impact of the coal power plant and overhead transmission line project is that more resources could be provided to the County of Lamu for setting up formal public services as the coal power plant would be an extremely important installation in Kenya.

### **10.3.14 Transportation and traffic**

Where construction of the proposed overhead transmission line occurs at road crossings, road traffic could be temporarily disrupted or delayed. Additionally, any abnormal loads transported along the Malindi – Lamu road may slow down traffic along the road. The transportation system where the proposed projects would be constructed is generally poor as Lamu County has only about 6km of tarmacked road.

The cumulative impact on traffic is congestion along the Malindi – Lamu road if abnormal loads are moved concurrently. Additionally, the locally employed project construction workers would commute to and from the project locations to Hindi, Mokowe and Lamu throughout the day. Once construction of the proposed overhead transmission line is complete, there would be minimal impacts on traffic from operation or maintenance of the overhead transmission line and associated facilities. However, the transportation impact will continue to be felt in the operational phase of the coal power plant when materials such as limestone, are transported from the identified quarries to the coal power plant project site.