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**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT SUMMARY FOR THE  
PROPOSED CONSTRUCTION OF 44.8MW MALAGARASI HPP AND ASSOCIATED 132KV  
TRANSMISSION LINE FROM MALAGARASI HYDROPOWER PLANT TO KIGOMA  
400/132/33KV SUBSTATION AT KIDAHWE KIGOMA**

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OCTOBER 29, 2019  
**TANZANIA ELECTRIC SUPPLY COMPANY LIMITED**

**PROJECT TITLE: MALAGARASI 45MW HYDRO POWER PROJECT**

**PROJECT NUMBER: P-TZ-FAB-004**

**COUNTRY: TANZANIA**

**CATEGORY: 1**

# 1. TABLE CONTENTS

- 1. TABLE CONTENTS ..... 3
- 2. INTRODUCTION..... 4
- 3. PROJECT DESCRIPTION ..... 4
- 4. PROJECT DESCRIPTION ..... 6
- 5. POLICY AND LEGAL FRAMEWORK ..... 6
- 6. ENVIRONMENTAL AND SOCIAL BASELINE..... 7
- 7. STAKEHOLDER ENGAGEMENT PROCESS ..... 9
- 8. PROJECT ALTERNATIVES ..... 10
- 9. POTENTIAL IMPACTS ..... 13
- 10. MITIGATION MEASURES..... 17
- 11. ENVIRONMENTAL AND SOCIAL MONITORING PLAN ..... 17
- 12. RESPONSIBLE PARTY ..... 18
- 13. BUDGET FOR ESMP ..... 19
- 14. DECOMMISSIONING..... 19
- 15. CONCLUSION ..... 19
- 16. REFERENCES AND CONTACTS..... 19

## 2. INTRODUCTION

The Government of Tanzania in corroboration with the African Development Bank (AfDB) through the Tanzania Electric Supply Company Limited (TANESCO) is intending to construct a 400/132/33kV substation at Kidahwe and 53km of 132kV transmission line from Malagarasi Hydropower Plant to Kigoma substation. The transmission line is intended to evacuate 44.8MW power generated from Malagarasi Hydropower plant to Kigoma. The 400/132/33kV substation will be constructed at Kidahwe in Kigoma District Council. The line will align from Malagarasi to Mazungwe (20km) in a 20m wide corridor acquired by TANESCO under the Millennium Challenge Account (MCA) and from Mazungwe to Kidahwe (33km) be aligned in a new wayleave to be acquired by the project. The proposed wayleave will go parallel with the proposed 400kV line from Kigoma to Mpanda under the North West Grid project (NWG). Therefore, the total distance of the transmission line is expected to be 53km.

Previous plan under Igamba II falls was to generate 8MW and construct 33kV line double circuits from Malagarasi Hydropower Plant for one circuit to go to Kigoma and the other circuit to go to Kasulu and Uvinza. But after the Malagarasi Hydropower Plant was changed to Igamba III, the power plant was upgraded from 8MW to 44.8MW making the suitable evacuation means to be through a 132kV transmission line. The change of the design of transmission line was mandatory in order to have conductors with sufficient capacity to transmit high voltage electricity from the power plant to the substation with little losses.

The 44.8MW from Malagarasi has attracted the construction of the 400kV transmission line from Nyakanazi to Kigoma under the NWG project. This is because at the moment Kigoma Region cannot consume 44.8MW hence the excess power will be pumped in the national grid to be used where there is a power demand. From the new Kigoma 400/132/33kV substation, several 33kV feeders will be constructed to feed power to Kasulu, Uvinza, Buhigwe and Kigoma. Currently Kigoma and Uvinza get power from diesel power plant located at Kigoma while Kasulu and Buhigwe receive power from Kasulu diesel power plant.

However, prior to construction of the proposed power transmission line and its associated facilities, the section 81(1) and third schedule of The Environmental Management Act, 2004 and first schedule of the Environmental Impact Assessment and Audit Regulations, 2005 requires the project proponent to undertake EIA study. In compliance to the provisions of this legislation, TANESCO commissioned Eng. John Lazimah, Mr. Tluway Sappa and Ms. Antuja Msuya to undertake EIA study for this project.

## 3. PROJECT DESCRIPTION

The proposed project involves a Construction of hydropower plant (44.8MW) utilizing Igamba falls stage III with associated facilities, a switch yard at Malagarasi. And construction of about 53km of 132kV overhead transmission line from Malagarasi Hydropower Plant to Kigoma 400/132/33kV substation at Kidahwe,

The proposed project will be located in Uvinza and Kigoma district councils. The hydropower plant is located at Igamba falls on the Malagarasi River in Igamba sub-village, Mazungwe village, Kazuramimba Ward, Uvinza District in Kigoma Region in western Tanzania about 100 km south of the town of Kigoma. The 132kV transmission line traverses Mazungwe and Kazuramimba in Kazuramimba ward, Kalengeand Mlela in Kandaga ward all in Uvinza District and Kidahwe in Kidahwe ward in Kigoma District.

The proposed Malagarasi Hydropower Plant Stage III was recommended after Malagarasi Stage II was dropped due to environmental concerns. The power plant has been designed to yield a maximum of 44.8MW using maximum water flow of 171m<sup>3</sup>/s and deliver 186.8 GWh with a plant factor of 0.48. The plant will have 3 generators rated 15.75MW each utilizing a head of 30.5m and unit water flow of 57m<sup>3</sup>/s.

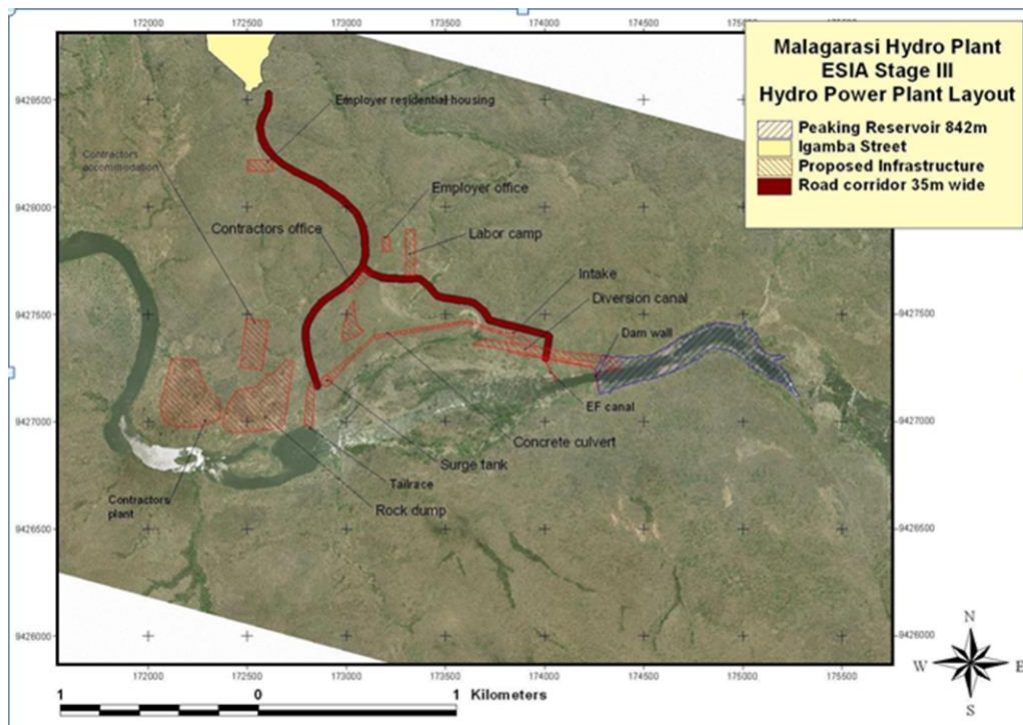
The transmission line will utilize a 20m wide corridor from Malagarasi switch yard to Mazungwe and 26m wide corridor from Mazungwe to Kidahwe respectively. Two types of towers are being considered mono tubular towers or self-supported lattice steel towers. Both will have concrete foundations.

The ESIA study was carried out in 2012 and certificate was granted in 2013. By that time the project was to be

financed by MCC but could not go be implemented because time was limited and MCC Phase I was winding up. The Malagarasi HEP project will now be funded by African Development Bank (AfDB) and Agence Française de Development (AFD). NEMC has granted EIA certificate for construction of 44.8MW hydropower plant and EIA certificate for construction 132kV transmission line to evacuate power Kidahwe substation. Bearing the fact that ESIA study for hydropower plant was done in 2013, TANESCO updated ESIA study to assess the changes on the environmental and socio-economic aspects in the project area and found out that most of the issues have not changed. The updated report shall be submitted to NEMC for records.

The main components triggering the ESIA study include:

- A dam and an intake pond above Igamba Falls functioning as a run-of-river pond most of the year producing up to 44.8MW during wet season and a daily ponding reservoir during the dry season to allow for up to 5MW power output, a headrace canal and a run-of-river power plant.
- A switch yard
- An access road of about 27km from the main Kigoma – Uvinza road south to the Malagarasi River and access feeder roads from power plant to other facilities
- A 132kV transmission line from Igamba to 400/132/33kV substation at Kidahwe
- Associated facilities including staff accommodation, workshop, power house, office



**Figure 1: General Malagarasi HPP layout plan**

### **a. Rationale of the Project**

Kigoma region depends on diesel power plant located at Kigoma, Kasulu and Kibondo to get electrical energy. Running these generation plants is expensive and unreliable due to cases of mechanical breakdowns, lack of spare parts and delay in fuel delivery and environmental pollutions. This unreliability and higher running costs of the diesel power plants denies local communities, businessmen and organisations in the region to engage in major socio-economic activities that directly depends on electricity. Therefore, the construction of 44.8MW hydropower project at Malagarasi necessitates the construction of 132kV line to evacuate the generated power to consumption centres of Kigoma.

### **b. Objectives of the Study and EIA Requirements**

The main objective of this study is to comply with the provisions of section 81(1) of the Environmental Management Act, 2004 and first schedule and section 15(iii) of the Environmental Impact Assessment and Audit Regulations, 2005, the African Development Bank Policy OS 1 – Environmental and Social Assessment and the World Bank OP 4.01 - Environmental Assessment. Hence, impacts of the proposed project on the biophysical environment and socio-economic aspects of the project area and areas of influence has been made and mitigation measures to reduce, minimize or avoiding severe negative impacts have been proposed.

### **c. Project Estimated Costs**

The cost for the proposed 132kV transmission line project is USD 9.805 million if it is a single circuit and USD 12.256 million if it is a combination of a single circuit from Malagarasi to Mazungwe and double circuit from Mazungwe to Kidahwe to accommodate 132kV from Tabora.

The cost for the 400/132/33kV Kigoma substation is estimated as USD 20.8 million. Hence, the total cost without compensation is estimated to be between USD 30.6 million and USD 33.0 million for the single circuit and a combination double circuit from Mazungwe to Kidahwe respectively. The cost for compensation of the line and substation area is about TZS 3.27 Billion or USD 1.46 Million.

## **4. PROJECT DESCRIPTION**

The proposed project is a power project involving a construction of about 53km of 132kV overhead transmission line from Malagarasi Hydropower Plant to new Kigoma 400/132/33kV substation to be constructed at Kidahwe in Kigoma District. The transmission will evacuate about 44.8MW to be generated at Igamba Falls stage III. The recommended corridor of the transmission line is 20m wide from Malagarasi switch yard to Mazungwe and 26m wide from Mazungwe to Kidahwe respectively. The preliminary design proposal is to use mono and double circuit tubular towers. The transmission line will require a total of about 126 Ha of land in entire 53km length.

Apart from construction of 132kV transmission line the proposed project will also involves the construction of 400/132/33kV substation at Kidahwe village in Kidahwe Ward in Kigoma District Council. The substation will have a capacity to receive a 400-kV line the national grid from Nyakanazi and Mpanda and receive the 132KV line from Malagarasi and Tabora. The substation will also accommodate several outgoing 33kV feeders for distribution lines to Kigoma, Uvinza, Kasulu and Buhigwe districts.

The substation will have one 400/132kV 120MVA power transformer and one 132kV/33kV 40MVA power transformer with each having a spare transformer. The rated power of the transformers covers the estimated power demand and include the generated power from Malagarasi hydropower plant as well as expected future load increase. The substation shall have a control building and shall be fenced to avoid electrocution of animal and people. Size of land for establishment of the proposed substation is about 150 ha.

The proposed project shall hire about 250+ labours during pick construction period and the number will vary according to construction schedules. During operation phase an estimated number of permanent staffs is estimated to be 30 to cover for the line maintenance staff, control room operation, office assistants, drivers and guards. It is proposed that the project should hire both genders according to the job requirement and experience.

## **5. POLICY AND LEGAL FRAMEWORK**

The Environmental and Social Impact Assessment (ESIA) for the project was conducted within the framework of a number of national legislations and policies relevant to the project, including the relevant environmental and social requirements of the Bank, and co-financiers, as well as relevant international environmental/social agreements relevant to the project.

The National Policy include the Energy Policy (2015), National Environment Policy (1997), National Land Policy (1997), and the National Water Policy (2002) for aspects of environmental protection and conservation.

*Legal instruments triggered* include;

The Environmental Management Act Cap 191 is the principal legislation governing environmental management in the country. The Environmental Management Act (EMA) recognises "...the right of every citizen to a clean, safe and healthy environment, and the right of access to environmental resources for recreational, educational, health, spiritual, cultural and economic purposes." Thus, the EMA "provides a legal framework for coordinating harmonious and conflicting activities by integrating those activities into overall sustainable environmental management systems by providing key technical support to Sector Ministries."

For effective implementation of the National Environmental Policy objectives, the EMA has identified and outlined specific roles, responsibilities and functions of various key players. It provides for a comprehensive administrative and institutional arrangement, comprised of:

- National Advisory Committee;
- Minister Responsible for Environment;
- Director of Environment;
- National Environment Management Council (NEMC);
- Sector Ministries;
- Regional Secretariat; and
- Local Government Authorities (City, Municipal, District and Town Councils).

Section 81, subsection 1 in Part VI of the EMA requires a project proponent or developer to undertake an Environmental Impact Assessment (EIA) at his/her own cost prior to commencement or financing of a project or undertaking.

The types of projects requiring EIA are listed in the third schedule of the Act. The EMA prohibits any development to be initiated without an Environmental Impact Assessment (EIA) Certificate.

Section 86, subsection 1, stipulates that" the NEMC shall upon examination of a project brief, require the proponent of a project or undertaking to carry out an Environmental Impact Assessment study and prepare an Environmental Impact Statement". According to the EMA (Subsection 1-4) the EIS should be submitted to NEMC, which carries out a review through its Technical Advisory Committee (TAC). The NEMC is also required to make a site visit during the review process for inspection and verification at the proponent's cost. The project proponent (TANESCO) has complied with all these requirements of the Act. Hence, the implementation of the project shall be made while adhering to the legal provisions.

Apart from EMA, 2004 there are other national legislations that the project should comply. These legislations among others include; Environmental Impact Assessment and Audit Regulations, 2005; the Energy and Water Utilities Regulatory Authority Act (Cap 414); the Electricity Act, 2008; the Land Act, 1999; The Land Acquisition Act, 1967 (Cap 118); The Village Land Act, 1999; The Water Resources Management Act, 2009; The Land Act, 1999; Village Land Act No.5, 1999; the Local Government (District Authorities) Act, 1982; the Occupational Health and Safety Act, 2003; Employment and Labour Relation Act, 2004; and the Workers Compensation Act, 2008.

Also, in order to meet international best practice, the ESIA development was further guided by the AfDB Integrated Safeguards System (ISS 2013) particularly OS 1 Environmental and Social Assessment; OS 3 Biodiversity, renewable resources and ecosystem services, OS 4 Pollution prevention and control, hazardous materials and resource efficiency and OS 5 Labour conditions, health and safety and the international conventions.

## **6. ENVIRONMENTAL AND SOCIAL BASELINE**

### **a. Malagarasi River and catchment**

The source of the Malagarasi River lies in the mountainous region, north of Kigoma and close to the Burundi border. From its headwaters, it flows in a north-easterly direction through hills and mountains, before it turns

southwards into a flatter landscape. The gradient is gentle and the river flows in large meanders, before entering the Malagarasi swamps in the south-eastern part of the region. The Malagarasi swamps are a distinct hydrological feature of the basin, exerting a controlling influence on runoff. The wetlands can swell during the rainy season to hold about 10 % of the catchment that drains to them. A large portion of the entire catchment drains through the swamps. At this point, the Moyowosi River joins the Malagarasi. Some 50 km downstream the Ugalla River converges with the main river. The river then runs directly west, before breaking through the Masito Escarpment, to form rapids and waterfalls (Igamba) on its final run to Lake Tanganyika. The Igamba area is the location of the proposed project.

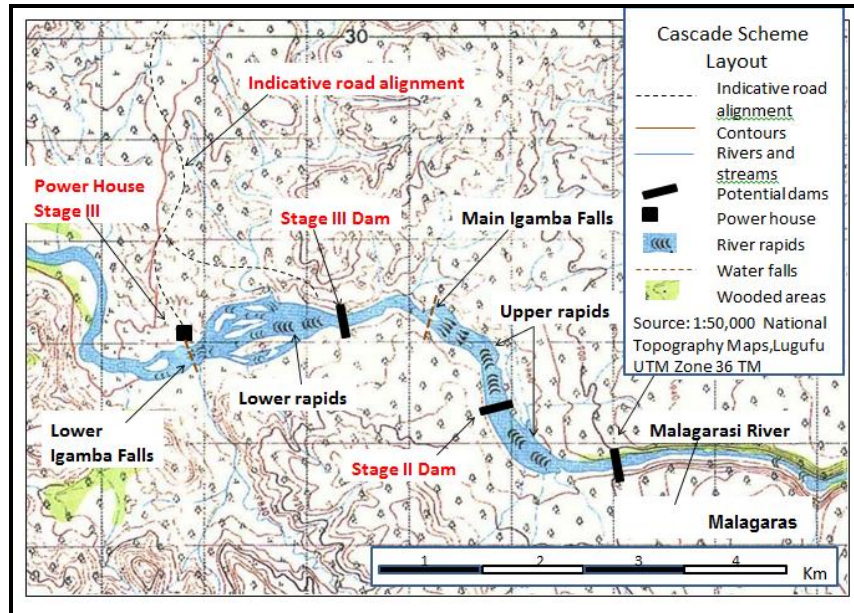


Figure 2: Malagarasi River and Location of Igamba III Falls

### b. Igamba Falls

The Igamba Falls and Rapids are composed of porous and fractured Upper Malagarasi Sandstone formation with extensive circular pothole erosion formations. This rock habitat lies between an upper catchment and Lake Tanganyika. The location and evolutionary history of the Igamba Falls area makes it a unique site from an environmental perspective. Its fauna, chemistry, substrate and productivity are different from other sites in the river system. As a result of its evolutionary history and geology a number of range-limited endemic species have evolved in the Igamba area of most interest to this project are the Igamba Snail which appears to favour the deep scour pools in the sandstone, and the Goby *cichlid* which is found throughout the falls area. The main habitat of these two species lies above the proposed Stage III scheme and will not be directly affected by the project.

### c. Land Cover and Use

The project area is covered by mixed woodland. The woodland is sparse along the river banks, at Stage III and downstream. All vegetation types, particularly on the right bank, are relatively disturbed due to recent past arable agriculture.

### d. Biological Features

Preliminary findings of the biodiversity survey of the project area and surroundings indicate that the area is potentially very rich in biodiversity because of its location in the Albertine Rift System. However, the area is highly disturbed by human settlements and activities such as farming, livestock herding, tree cutting for timber and poaching. Species of special concern include the *Igamba goby Cichlid*, *Orthochromis sp. Igamba Suckermouth*, *Chiloglanis sp.* and Igamba snail (*Gastropod mollusc*) which was not observed at Igamba III site.

The vegetation of the project area (Igamba) is strongly influenced by the river and alluvial soils. The proposed



project area is mainly covered by Riparian woodland, Mixed with Miombo woodland and Miombo Woodland on flat terrains. These woodlands are dominated by trees of the subfamily Caesalpinioideae, particularly species belonging to the *Brachystegia*, *Julbernardia* and *Isoberlinia* genera, which seldom occur outside miombo.

The area between Kazuramimba and Igamba Falls is dominated by miombo woodland. Dominant species in the miombo woodland include; *Pterocarpus angolensis* (Mninga), *P. tinctorius* (Mkulungu), *Brachystegia spiciformis* (Mtundu), *B. boehmii*, *Julbernardia jubiflora*, *Milicia excelsa*, *Azelia quanzensis* (Mkora), *Diplorrhynchus condylocarpon*, *Khaya anthoeca* and *Makhamis* sp. Others are *Bridelia* sp., *Vitex fischeri* (Mpapa), *V. doniana* (Mitunda Ugoro) *Isoberlinia scheffleri* and grass species.

#### e. Socio-Economic Aspects

There are few socio-economic activities that are being practiced at the areas of influence to the project site. These include small scale and seasonal fishing activities, fresh water from the river, bee keeping, farming, limestone mining and seasonal hunting. Most of the social amenities are at poor quality. Among the services that are slightly accessed by local communities at Igamba includes primary school, local shops, churches and transportation. During project implementation most services such as transportation needs to be improved.

Most of the local communities affected by the project are small-scale farmers, practising agriculture and livestock keeping as their main economic activities. Few PAPs, especially in semi urban areas, are employed or self-employed in commercial and service activities. Farmers mostly practice subsistence farming with very low annual output. There is very little use of agricultural fertilizers and mechanization. The crops grown include palm oil trees for cash crops, whereas food crops include cassava, sweet potatoes, maize, groundnuts and beans.

## 7. STAKEHOLDER ENGAGEMENT PROCESS

The consultation of relevant stakeholder to the proposed project was conducted at national, regional, district, local and village level. List of consulted stakeholders with their attendance was attached in the ESIA report shared with you. Regarding this project, a participatory approach is adopted as an on-going strategy throughout the entire project cycle. The overall goal of the consultation process was to disseminate project information and to incorporate affected people's views and concerns in the RAP and ESIA reports. A detailed explanation of the project and its impacts were therefore made during PAPs consultations. Projects impacts were discussed in terms of positive and negative/ adverse impacts. Also, PAPs were made aware of the alternatives or mitigation measures to control, minimize or avoid the negative impacts and enhancement measures for positive impacts of the project.

Key project stakeholders:

- Regional and District Officials (Kigoma and Uvinza Districts and Kigoma Region)
- Public and local government leaders affected by the project (i.e. Mazungwe, Kazuramimba, Kalenge, Mlela and Kidahwe villages and Igamba sub-village)
- Government Agencies and other relevant stakeholders (Ministry of Natural Resources and Tourism - the Division of Antiquities, TANROADS, TANESCO, Jane Goodall Institute (JGI), Lake Tanganyika Water Basin, Gombe-Mahale National Park, RAHCO Kigoma Office, Belgium Technical Cooperation (BTC), Kigoma AIDS Control Network (KACON), Mandela Paralegal Organization (MAPAO), Hopes of the Community Foundation (HCF), and Vijana Pamoja Twaweza (2014).

Several issues were raised during the stakeholder engagement process and community meetings regarding the project. Most of the concerns and views of the stakeholders and responses provided during consultations included the following:

- The affected villages demanded to benefit from the project in various angles including construction employment, construction of health centres, water supply and construction of Secondary schools and vocational training centres. TANESCO will make sure contractor is instructed to employ local people of the respective area for works that requires little skills such as manual labour during the construction works. Also, TANESCO and project financier will support other measures to ensure the project benefits the most affected communities particularly Mazungwe village.

- Most of the villages demanded to be electrified after construction of the proposed project: The national regulation clearly stipulates that project of this kind should benefit society by electrifying their villages. So, the project in collaboration with Rural Energy Agency (REA) shall ensure that rural electrification and electricity densification component is implemented.
- Stakeholders were worried on new transmission and or spread of HIV/AIDS diseases: TANESCO with the help of NGO's and experts from district/ward shall conduct awareness on ways to control new spread of HIV/ AIDS.
- PAPs demanded their engagement in the whole project cycle.
- The Contractor shall take into consideration of cultural property; TANESCO shall respect all cultural properties of any society and will compensate those to be relocated and for such sites not to be disturbed, the project will offer alternatives to avoid the area.
- Most of the stakeholders requested TANESCO to consider helping the villages affected by project by providing the needed social service such as water services, schools and health centres as part of the Corporate Social Responsibility.
- The region needs the project urgently and do not need any more excuses like the previous financier. Kigoma is lagging in industrial sector due to lack of reliable power.
- TANESCO need to ensure land acquisition process is done according to the relevant national legislations and payment of compensation is done fairly and promptly. Further the process should be transparent and inclusive of project affected persons (PAPs)
- TANESCO and the Government need to protect water catchment areas if the project is to be sustainable for a long time. There is a huge deforestation going on in the catchment.
- TANESCO should work hand in hand with Malagarasi River Water Basin to protect the river flow by making sure communities do not cultivate and graze in water courses, river banks and wetland areas in the catchment
- Human activities have driven away Chimpanzee in the project area. In the project area there are no such animals as they have migrated to other areas.
- The project area is covered by miombo woodlands which are abundantly found in many parts of the country. Hence miombo woodland in the project area should not be a concern
- Fire is an environmental problem in the project area; however, for miombo woodland yearly fires are better than when there is no fire for many years

A detailed stakeholder Engagement Plan (SEP) for the project is available indicating future consultations as this is viewed as an ongoing engagement.

## 8. PROJECT ALTERNATIVES

### a. No Project Alternative

The no project alternative entails retaining the current status quo without developing the project and therefore foregoing such investment. That is to say the Malagarasi hydropower project will not be able to evacuate the generated power hence not worth constructing it. In addition, Kigoma region will continue using diesel power generation unless the 400kV transmission line from Nyakanazi brings power to the region. Even if the grid reaches Kigoma it will not be stable and reliable. Industrialization dream of Kigoma will dash away as potential investors will continue to shy away from Kigoma region due to power shortage.

People and government in the districts of Kasulu, Kibondo, Buhigwe and Uvinza will continue using generators and thermal power plants to generate power and thus release pollutants to the air, soil, water and other environmental resources. The dream of Mazungwe and other villages to benefit from the project will also disappear and the resources spent for the various studies of Malagarasi will be lost. On the other hand, TANESCO will continue spending millions of money for diesel power generation in Kigoma, Kasulu and Kibondo while the sale of electricity is below the generation cost. Failure to implement the project will affect TANESCO and the country because the money spent for fuel, maintenance and spare parts could be used in other important social activities like education, health care and road construction.

In fact, this decision will not disturb the existing environment and will not take any land of the project affected people (PAPs). However, it will deny the economic gains through employment, government revenues direct and indirectly from availability of electricity and social development in the region that could have enabled people to initiate agro-processing industries, which also could have increased farm employment thus optimization of rural community livelihoods. TANESCO will not gain the benefits accrued from expansion of the national grid power line. Rural areas where the project would supply them with the electricity will continue with experience hardship related to power shortage.

In other words the “Zero Option” is not in line with the Government policies of improving the investment development in order to achieve the requirements of National Strategy for Growth and Reduction of Poverty II (NSGRP II/MKUKUTA) as envisaged in the Tanzania’s Development Vision (Vision 2025) which stresses on development and commitment to regional and other international initiatives for social and economic development and industrialized Tanzania.

### **b. Alternatives on other sources of energy**

About 53.1% of electricity generated by TANESCO is generated from Hydropower plants. The remaining electricity (46.9%) is generated from thermal power plants. As a country when independent power producers are considered, the hydropower contribution is 41.5% while thermal power plants contribute 57.7% (TANESCO, 2016). Other sources of electricity that are not yet harnessed but considered as potential options in the country include; Coal, Solar, Geothermal, Wind and Biomass.

- Any generation source be coal, or solar will need a transmission line to evacuate the generated power, will need a substation and will need a switch yard. The only difference is how long the transmission line will be depending on the sitting of the power source. Hence, there is no alternative to the power transmission line be a coal power plant, hydropower plant, geothermal, wind, large solar power plant, a biomass power plant or grid extension. However, generation from coal is far worse than the proposed source of hydropower plant when environmental issues are concerned. Only small solar power plants may not need a transmission line or grid substation. But this will not provide the needed power for industrialization of Kigoma.
- Expanded diesel power plants at Kigoma, Kasulu and Kibondo; this could be the best alternative as the current transmission lines will be used to evacuate power from the power plant. However, as the capacity increases so the substation will be required to be upgraded. But, great weakness of diesel power plants is running costs. For instance, similar power plants with smaller capacity (e.g. 100MW IPTL and 60MW Nyakato Mwanza) although they can feed enough power into the national grid but have proved to be prohibitively expensive with the current tariff structure.

Hence in terms of generation, it can be demonstrated that the 44.8MW to be generated from Malagarasi Hydropower plant (Igamba III) if transmitted from the power house to 400/132/33kV substation at Kidahwe ward in Kigoma district would supply reliable and affordable electricity in northwest regions.

### **c. Alternative sources for construction materials**

The construction of the proposed 132kV transmission line towers will require reinforced foundations, whose raw materials such as sands, aggregates, refilling soils will be sourced from approved sources in Uvinza and Kigoma district councils while cement may come from internal cement factories agents (Twiga, Simba, Dangote, Tembo, Nyati etc.). Use of cement from these local sources is encouraged in order to boost business opportunities of local companies and suppliers. Reinforcing bars will also be sourced locally from local industries. However, all these materials should meet the quality specifications required by the project. Water requirement for the project and residential houses could come from Malagarasi River, Nkuti, Kidahwe River and other sources available close to the project area.

#### d. Alternative on project location

The proposed 132kV transmission line from Mazungwe village to Kidahwe is expected to run parallel with the proposed 400kV transmission line (Northwest Grid project) while in other parts the route will utilize the compensated way leave corridor of previously planned 33kV distribution line. In this regard, the location of the proposed 132kV transmission line route is cost-effective and socially viable because it shall have minimum impacts on resettlement issues. However, optimization measures have been taken to avoid water sources, removing sharp angle tower and shortening the distance where it was seen possible. The location of the project route is anticipated to have less adverse impacts on natural environment. Figure 29 and the attached maps indicates some of the alternatives considered.

#### e. Substation Site:

Both previous recommended substation plots by SWECO and TANESCO have the following characteristics:

SWECO Proposal:

- The site is located about 9km from the main road
- Access road needs much improvement for the whole length of 9km
- Located in unsettled area with land uses being cultivation
- Located on gentle uphill land with relatively flat land

TANESCO Proposal:

- The site is located about 300m from the main road
- The 300m access road will need to be constructed
- It is bordering Mikamba Secondary School land area
- It is unsettled area with limited cultivation
- It is relatively flat
- It provides easy connection of 132kV transmission line compared to SWECO proposal with cost saving of about 11km distance of 132kV
- Direct connection of 400kV line from Nyakanazi to the Kigoma Substation affects the Mikamba Secondary school and its environment.
- It shortens the length of 400kV transmission lines by about 14km
- The option reduces one angle tower of 400kV line.

In view of the above, TANESCO proposal is much better compared with SWECO proposal. However, it needs to be optimized to address the identified shortfalls.

Hence, following the optimization of TANESCO proposal the substation location has been shifted by 1km away to the western direction with location coordinates (810536E, 9458644N) with datum WGS 84 at elevation of 903 masl, (refer Figure 29). This location has the following characteristics:

- It has prevented impacts on Mikamba Secondary School and its environment,
- It provides easy connection of all transmission lines (i.e. incoming 400kV from Nyakanazi, outgoing 400kV to Mpanda, incoming 132kV line from Tabora and from Malagarasi).
- It has shorten the construction distance of 132kV transmission lines by 10km
- It has shortened the construction distance of 400kV transmission lines by 12km
- It has shorter access road to the substation site. Hence it requires a construction of access road of only about 200m – 300m from the main road
- The site is relatively flat with enough space if additional land will be required.
- It is in unsettled area with limited cultivation.
- This substation site location option eliminates two angle towers of both the 400kV line and the 132kV line.

Further, TANESCO though, feels that the power supply at the end of a long transmission line will be limited and possibly erratic without generation at Kigoma. TANESCOs opinion is that the Malagarasi Hydropower scheme is important as it will serve to stabilise power in the interconnector and feed surplus power back into the national grid.

## 9. POTENTIAL IMPACTS

There are number of positive and negative impacts that are associated with the proposed project. The potential positive impacts include the following:

- Reliable supply of electricity
- Reduced TANESCO's operational cost of running the diesel generator as base power in Kigoma
- Increased employment opportunities created as a result of the project and indirect employment opportunities resulting from providing services to the project.
- Income generation in the form of taxes and service levies to government and district councils.
- Capacity building of local labours engaged in project activities
- Improvement of social services in the project area as part of Corporate Social Responsibility initiatives and from the use of reliable electricity
- Industrialization of the Kigoma Region if electricity is well utilized
- Expansion of the business opportunities in the project areas ranging from providing services to supply of materials and equipment

The potential environmental and social negative impacts include the following:

- Loss of land
- Loss of trees and crops
- Loss of Shelter
- Loss of vegetation
- Temporally air pollution from fugitive dusts, suspended particulate matters and smokes
- Noise nuisance
- Influx population in the project area
- Loss of biodiversity and natural habitats due to vegetation clearance
- Risks of increased crimes due to joblessness and increased income of some individuals in the project area
- Risk of soil erosion and land degradation
- Increased risks of landlessness and food insecurity to some PAPs
- Risks to Health and Safety of the communities around the project area and spread of HIV/AIDS and other communicable diseases.
- Occupational health and safety of workers
- Impairment of water quality and soil due to pollution (liquid and solid wastes)
- Project related accidents
- Loss of cultural properties

**Table 1: Impact Analysis Matrix**

Topic	Phase	Predicted Impact	Impact Assessment
<b>PHYSICAL</b>			
Water quality	Con	Impact on water quality	Low Negative
	Con	Changes in river flow	Medium Negative
	Op	Impact on water quality	Minimal / None to Low Negative
	Overall Hydrological Impact		Medium Negative
Soil erosion and land slides	Con	Erosion risks on steep slopes and river banks	Low Negative
	Con	Soil contamination	Low Negative
	Overall Impact on Geological and Soils		Low/ Negative
Landscape	Op	Disturbance of landscape by new road, TL HPP infrastructures	Low to Medium Negative
	Op	Visual intrusion in the landscape (other	Low Negative

Topic	Phase	Predicted Impact	Impact Assessment
		sections)	
	Overall Impact on the Landscape		Low Negative
<b>BIOLOGICAL</b>			
Vegetation	Con	Vegetation loss due to clearance and resource use	Minimal / None to Low Negative
	OP	Vegetation disturbance by immigrants at Igamba	Minimal / None
	Overall Impact on the flora and vegetation		Low Negative
Wildlife (Terrestrial Fauna)	Con	Disturbance of habitats for small animals	Low to Medium Negative
	Op	Change and loss of riverine habitat, birds collision	Low to Medium Negative
	Overall Impact on fauna		Low to Medium Negative
<b>HUMAN</b>			
Land use and loss of Land	Con	Disturbance of land use	Low Negative
	Con	Loss of land	Low to Medium Negative
	Overall Impact on Land use and loss of Land		Low to Medium Negative
Loss of crops and Trees	Cons	Permanent crops and farm trees will be destroyed	Medium to High Negative
Resettlement	Cons	Relocation of permanent structures/houses.	Medium to High Negative
Disease	Cons/Op	Impact from Spread of HIV and Disease	Low to Medium Negative
Dust and Noise	Cons	Increased dust during construction	Low to Medium
Archaeological and cultural heritage sites	Cons	Grave relocation and removal of Traditional Worshiping if any	Minimum or None
Graves	Cons	Poles erection on graves	Minimum or None
Electromagnetic Fields and Electrocutation	Op	Injury and death as result of contact with live wires	Low to Medium negative
Social disruption and conflicts	Cons /	New culture and attitude by project workers to hot communities	Minimum or None
Traffic accidents	Cons/ Op	Speeding vehicles in village settlements	Low to Medium Negative
Employment	Con	Employed in unskilled labour tasks	Medium to High Positive
		Employment Opportunities	Medium to High Positive
	Op	Permanent employment in TL operations	Low to Medium Positive
	Op	Increased processing of agricultural products hence employment	Medium to High Positive
	Overall Impacts on Employment		Minimum to Low Positive

### a. Key Issues

**Resettlement and Land take:** The proposed construction of hydropower plant (44.8MW) with associated facilities and construction of about 53km of 132kV overhead transmission line will affect about 646 PAPs and 1592 Ha (3934 acres) of land for both hydropower plant area and the 53km long transmission line. These PAPs will be required to relocate outside the proposed hydropower plant area and transmission line corridor areas. About 646 people will have to be relocated out of them 8 physically relocated with a total land take of 1,592 Ha with land breakdown.

**Loss of Vegetation and habitats:** The existing terrestrial vegetation on the proposed site will be destroyed during route clearance for the construction of the project facilities. Construction of the proposed project in the water course and along river that is characterised by riverine vegetation will also lead to loss of these vegetation and habitats for birds, animals and insects. However, the clearance of vegetation will be confined

within the project area and transmission line wayleave corridor only. Hence, the impact is very small as the project site is not located in the sensitive ecological area. The result of the ESIA study which was done along the proposed power plant, transmission line route and areas of influence has identified that most of the project areas were already disturbed by other anthropogenic activities such as bush fire, farming and livestock keeping. Other land cover include miombo woodland, bush lands and shrubs, short and long grasses. All these vegetation shall be cleared at the early stages of project mobilisation phase. This impact is rated as negative, less severe and insignificant because clearance of vegetation shall be confined within the wayleave corridor.

**Change of Land Use and Loss of Land:** The construction of the proposed power plant and associated facilities such as transmission line, switchyard and substation will lead to the permanent loss of a relatively limited amount of agricultural land. The total loss of agricultural land will be confined within the wayleave corridor of 20m from Malagarasi to Mazungwe (20km) and 26m way leave corridor from Mazungwe to Kidahwe (33km) and the substation area. The base of the transmission line poles will occupy an area of approximately 25m<sup>2</sup> in each tower. Area for substation will be 150 hectares. The line will require some permanent land take. It is estimated that 126 hectares will be needed for this purpose. This impact is rated significant, irreversible and long-term impact. However, project affected person will not severely impacted because all losses shall be equally compensated according to the national legislations.

### **Loss of Crops**

**Annual crops:** The construction of the proposed power plant, transmission line and substation could involve the loss of annual crops in the corridor for Transmission Line, substation site and on land used for accessing construction areas. The actual loss will, however, depend on the effective prior notification that TANESCO undertake to advise potentially affected people about the start of construction activities. Effective prior notification will enable those affected to refrain from planting crops or to harvest already planted crops before they are damaged by construction works.

With good planning it will also be possible to schedule construction activities so that most activity takes place in the dry season when the cultivation of crops is minimal. **Fruit trees and other valuable plants:** Due to the need to minimise the risk of electrical discharges, tall trees cannot be left standing in the corridor for Transmission Line. Thus, both fruit trees and other types of trees will have to be removed prior to construction of the proposed transmission line.

**Physical Resettlement Impact:** During the RAP and EIA studies in the project areas there was no any building structure that was found within the TL wayleave corridor, substation and switch yard areas. This was so because the preliminary survey conducted during route selection had considered the efforts to reduce the impacts of resettlement and relocation. However, a stretch of 20km length with 20m wayleave corridor from Malagarasi to Mazungwe had residential and community structures mainly churches were compensated and relocated. This impact is considered negative, long term and significant.

**Increase in risks of food insecurity to PAPs:** The proposed project is expected to be executed on the land size of about 276 hectors of which approximately 75% of this land is utilized for farming activities. The acquisition of this land will lead to farm loss and disturb farmlands. This will consequently pose the risks of food insecurity problem to affected PAPs. Also, loss of seasonal and perennial crops such as sweet potatoes, cassava, palm and fruits trees might increase the risks of food insecurity particularly to affected PAPs in the villages that are traversed by the proposed project. This impact is regarded as low to medium and insignificant because the proposed transmission line will only affect the way leave corridor of 20m from Malagarasi to Mazungwe segment and 26m from Mazungwe to Kidahwe segment. Also, the PAPs will be given notification to harvest the crops before the contractor starts clearance works.

**Water pollution:** Activities that shall be done during operation of the power plant and transmission towers situated near water courses would result to risks of polluting water quality. For instance, maintenance activities which would be involving use of lubricants, oil and grease might lead to contamination of surface water. Pollution of water quality through application of contaminants would lead to direct impact on the aquatic

organisms. Also, eutrophication of river due to addition of materials during project operation phase might lead to pollution of water quality and reduction of the river depth. This impact is considered low, insignificant but irreversible.

**Electrocution and electromagnetic effect:** During the operation phase, the presence of high voltage conductors hanged on the transmission line towers connecting the new hydropower plant with the substation pose a safety concerns and risks to the working staff, birds and the community along the project. Unless safety measures are observed, the impact will be severe, long term and irreversible as it may cause death when it happens. However, the likeliness of happening is small though it is of high risk. However, since the transmission line way leave corridor will have restricted uses, safety measures will be in place and enforced, safety warning will be posted, switchyard and substation will be fenced and guarded, the risks to the people around has been reduced to low risk to negligible. In addition, further awareness will be required for the communities around and project, staff, and other passers-by to observe and follow safety measures and avoid all areas of high-tension potentials to reduce the risk of electrocution.

**Problems related to noise and vibrations:** During operation of the power transmission line and substation, there will be regular and periodic noise primarily coming from running conductors and high-tension transmission lines and overloaded transformers. It is expected that for 132kV line the conductor noises will be small in addition, the substation transformers of 40MVA will have no noises at least at the beginning as total power demand for Kigoma region is still about 10MW. There will be no vibration resulting from the project. This impact is negative with low significance to insignificant. In any case the project will need to operate within the standard levels.

#### **b. Key Positive Impacts**

**Reliable power supply:** Following the commissioning of the 44.8MW hydropower plant, the contractor will also construct other project components such as 132kV transmission line, Switchyard and substation for successful transmission of power to Kigoma and connecting the same to the national grid. Once the construction of these project facilities is accomplished, Kigoma region and other North West regions will have reliable electricity. This impact is considered positive and long term.

**Employment Opportunities:** During construction, there will be a need for unskilled labour, for instance in connection with clearing the plant area, substation area, switch yard area and TL route, digging and construction of holes for the transmission poles. Workers for such jobs will most likely be recruited locally. It is estimated that up to a total of 200+ unskilled labourers could be needed. The construction of the proposed transmission line will take at least one year. The impact of the job opportunities created for the local people and the influx of some specialised teams of workers and engineers from outside the project area will contribute to increasing local economic activity in the project area. Therefore, increased demand for food and services leading to temporary increase in the income amongst local people, especially women through the selling of food to the construction workforce. Overall it is considered that the proposed project will have a Minimal – Low Positive impact on employment activities.

**Socio-economic enhancement and increased income:** Host communities will benefit from rendering services to the project workers such as selling foodstuff, drinks and other supplies, during the construction phase. The use of locally available materials during the construction phase including cement, sand and aggregates, etc., will contribute to the gross domestic product thus uplifting the region's economy. The consumption of fuel, oil and others will attract taxes including VAT, road fund, rural electrification fund, etc., which will be payable to the government. Hence increasing government revenue and funds for other development. The cost of most raw materials will be payable directly to the producers. The impact is positive, short term, low to medium significance since the areas still have very low market opportunities.

**Capacity building of the locals:** The construction crew that will be hired from the villages traversed by the proposed project and associated substation and switchyard, some of them fresh from colleges and vocational



training institutes, shall be trained and capacitated on various skills pertaining to the construction of transmission line, concrete works, welding, erection and installation of electrical works in substation, switchyard and other buildings. The skills that will be acquired during construction of this project shall be used in other projects and eventually assist the locals in their daily income generating activities. This impact is regarded as positive, long term and of medium to high significance. It shall span throughout the project implementation (construction), operation phases and beyond.

**c. Major Upstream Threats are:**

- Threat of reduced dry season river flows due to changes in land use upstream and failure of the Malagarasi – Moyowosi Ramsar Site to successfully manage the upstream swamps.
- Climate changes that may severely impact the hydrology and river flows.

## **10. MITIGATION MEASURES**

The Environmental Impact Statement (EIS) presented an outline Environmental and Social Management Plan (ESMP). The Environmental and Social Management Plan (ESMP) has been developed to ensure that the recommended mitigation measures for the identified potential impacts are properly managed to enable TANESCO to comply with all applicable laws and regulations. The ESMP contains recommendations, cost estimates and responsible person for implementation of mitigation measures designed to address the negative impacts of the project. Much of the day to day responsibility for implementing the ESMP is vested to the contractor with supervision from TANESCO PIU.

Several the proposed mitigation measures and risks management measures have been recommended in the main ESIA text. However, the main mitigation measures include the following:

- Location of the hydropower dam site (at the bottom of the rapids and below the main habitat used by the endemic species).
- Construction of the run-of-river scheme with dry season daily storage that does not significantly increase the size of the reservoir area
- Maintenance of environmental flows of 10m<sup>3</sup>/s to safeguard the aquatic ecosystem downstream
- The remaining area of the cascade (Igamba I and II), including the main falls and key aquatic habitats should be protected and used to enhance the tourism value of the Masito-Ugalla Ecosystem area situated on the left bank of the Malagarasi river.
- Management of the catchment and catchment land uses should be emphasized to ensure long term operation of the power plant. It is in TANESCO's interests, through the LTBWO and the Ramsar secretariat to become more involved in river basin management and the protection of the upstream Ramsar site.
- The Contractors shall to the extent possible, limit cutting or pruning of trees or shrubs within the RoW of the T-line.
- During the operation phase, vegetation along the RoW should not be cleared down to ground level. This will allow regeneration of vegetative cover thereby conserving flora and fauna of the area as well as prevent erosion.
- Use of local people for any available job vacancies appropriate to their level of knowledge is important to increase project acceptance and distribution of income in the area (employment to local people)
- The Contractor(s) must prepare site waste management plans prior to commencement of construction activities. This should include designation of appropriate waste storage areas, collection and removal schedule, identification of approved disposal site, and a system for supervision and monitoring and disposal of the wastes
- Workers to be trained on the issues of HIV/AIDS, health and safety and personal protective equipment /gears should be provided to every worker at work sites

## **11. ENVIRONMENTAL AND SOCIAL MONITORING PLAN**

Environmental Monitoring Plan is to be implemented as a complimentary component to the Environmental Management Plan to monitor the impacts of the proposed project and the mitigation measures and to provide a permanent record of such monitoring. The monitoring program proposed for TANESCO operations, is based

on the existing environmental impacts identified during the ESIA study. Environmental Monitoring Plan (EMP) provides a roadmap which assist stakeholders to monitor (1) Implementation of the proposed mitigation measures and (2) the efficacy of the proposed mitigation measures. The Plan detailed parameters and frequencies as well as institutional arrangement for monitoring & evaluation and auditing. Internal monitoring & evaluation an Environmental Auditing are important to check the efficacy of the proposed measures and improve the performance. However, external monitoring, evaluation and auditing at least by annual basis is also important to eliminate wrong perception of the stakeholders and as well assist in improving the performance and give feedback to other stakeholders including the project financiers. The objectives of the Monitoring plan are to:

- Provide a permanent record of compliance with ESMP against the present and future legislation;
- Control risks and (significant) environmental impacts;
- Control and improve the project based on the operational information gathered;
- Monitor continuous improvement of the environmental and social management system;
- Provide a simple framework to improve the level of environmental management and compliance;
- Co-ordinate and integrate the tasks of the project proponent and those of the governmental agencies involved in the project implementation; and
- Integrate present and future environmental and social monitoring activities.

## 12. RESPONSIBLE PARTY

TANESCO is committed to undertake its works in such a way that is respectful to the local communities and to the applicable Tanzania environmental laws and regulations in a sense that health and safety of people, their livelihood and customer services are protected and maintained.

The Environmental Department as well as the Health and Safety Department at TANESCO head office are instrumental in monitoring the environmental and social mitigation measures in the ESMP.

The responsibilities of TANESCO will include:

- Advising employees and contractors on safety, health and environmental requirements and hold them accountable for poor performance.
- Managing activities to minimize environmental and human health impacts.
- Monitoring, evaluating and reporting performance on safety, health and environmental protection
- Providing training when needed to protect human, environment, cultural and physical resources

The responsibility of a contractor among other things will include:

- Ensuring compliance with the requirements of the ESMP as a minimum standard to minimize socio-economic impacts on affected communities.
- Preparing and submitting plans for complying with social and environmental requirements during implementation of the project.
- Conducting periodic compliance audits and provide the necessary information for such purposes, in addition to daily monitoring of the project in line with the ESMP.

Responsibilities of NEMC among others include:

- To ensure conditions of the EIA certificate are complied with
- Regular environmental inspection during project construction and operation
- Monitor the baseline data on air quality, noise, soil and water in comparison to national international standards
- Audit Environmental compliance

Responsibilities of district officials lead by DC includes;

- Ensure peace and tranquillity within the project area and district at large
- Ensure all project facilities are not jeopardized and vandalized
- Ensure all communities are loyal to the project

- Ensure contractor commits all rights to unskilled and local labours

### **13. BUDGET FOR ESMP**

The project has prepared an ESMP and provided an estimate of the costs for its implementation tentatively estimated at USD 255,000 (Two hundred and Fifty-Five Thousand United States Dollars). These costs have been aligned to address the mitigation measures highlighted above. A separate budget of USD 205,000 (Two hundred and Five Thousand United States Dollars) has also been provided for monitoring implementation of the ESMP for both the Hydropower Project and the associated transmission line.

### **14. Decommissioning**

It is expected that the project could be in operation for over 40 years of operation with possibility of extension of life through regular maintenance. It is after this lifespan that the decommissioning plan will be affected. A preliminary decommissioning plan has been recommended. It is envisaged that the project removal will begin six months before the closure date and will continue for six months. Within the first six months TANESCO will take inventory of all components that need to be removed and or disposed of and undertake special training to employees geared to be jobless after the closure of the plant and the transmission line.

This inventory will include building structures to be demolished and machinery and equipment to be relocated and those to be disposed of. The mode of disposal and identification of actual contractors for demolition will be finalized within this period. This information will assist in the preparation of the final decommissioning plan, decommissioning and transfer budget, retrenchment costs, etc. During the next six months the decommissioning plan will be finalized based on the approved conditions imposed by the National Environment Management Council (NEMC).

### **15. CONCLUSION**

The proposed Malagarasi HPP and associated 132kV Transmission Line project are of major importance for the socio-economic development of Kigoma region and Tanzania in general. The lack of basic modern energy services in Kigoma and in most rural areas of Tanzania has been perceived as a bottleneck in social and economic development and for which this project constitutes a major step for its solution. However, as required by Tanzania law, an ESIA was conducted for the proposed project and NEMC has issued the EIA certificates for both the hydropower and transmission line projects. The goal of the ESIA Studies was to identify anticipated impacts and cumulative impacts resulting from the proposed project determined based on the baseline conditions established during the field work and information obtained from the project documents. This summary has been prepared in fulfilment of Bank disclosure requirements for the summary to be posted on the Bank website for information as well as enable interested members of the public to access it and provide feedback as appropriate.

Overall, if the mitigation measures proposed through the ESIA Studies are implemented, this will significantly contribute to reducing the negative impacts arising from construction and operation of the projects. Several impacts are site specific, short-term and of a temporary nature and can be readily addressed. In addition to implementation of the ESMP, continued stakeholder engagement will also contribute sound implementation of the projects as it will enable mechanisms through which the project management will be able to get feedback from people affected by the project in one way or another.

### **16. REFERENCES AND CONTACTS**

- The Environmental Impact Assessment (EIA) Report for the Proposed Construction of 132 kV Transmission Line from Malagarasi to Kidahwe Substation (53 km)
- The Resettlement Action Plan (RAP) Report for the Proposed Construction of 132 kV Transmission Line from Malagarasi to Kidahwe Substation (53 km)
- Valuation Report for the Hydropower Plant Area, Malagarasi HPP Igamba in Mazungwe Village Uvinza District
- African Development Bank's Integrated Safeguard Policy

- Updated Environmental Impact Assessment Report for the proposed Malagarasi Stage III 44.8MW Hydropower Plant at Igamba Falls on the Malagarasi River in Igamba Sub-Village, Mazungwe Village, Kazuramimba Ward, Uvinza District in Kigoma Region

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