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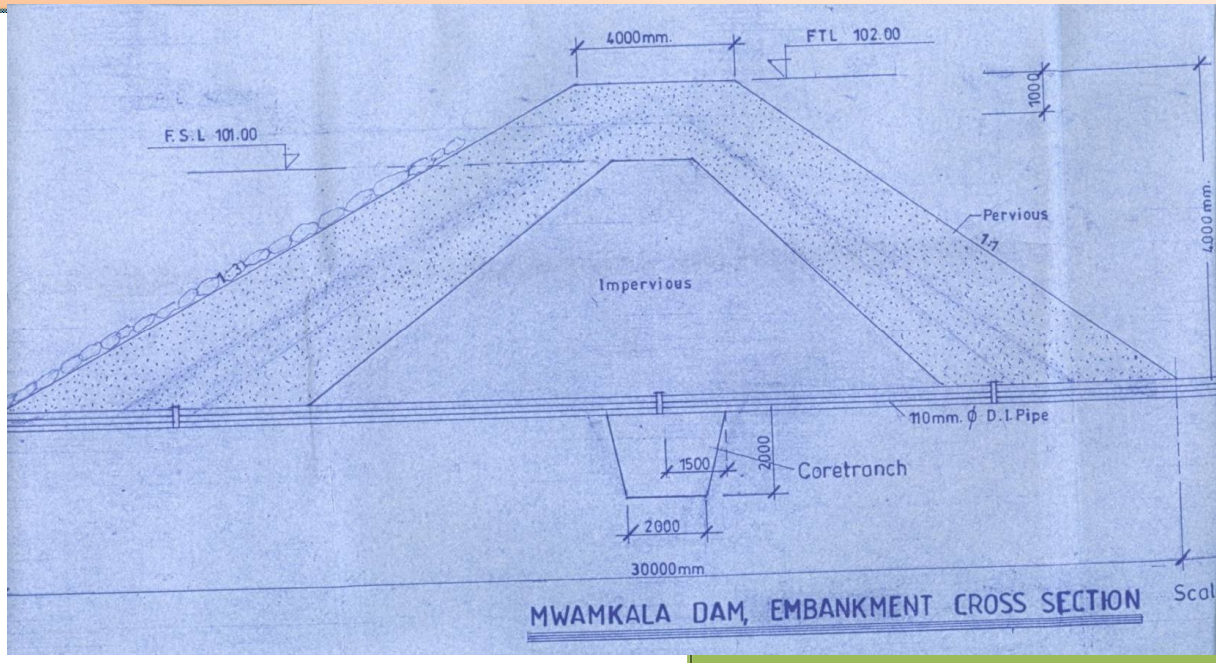
Mwamkala Village Council

P. O. Box 200

Magu, Mwanza

Preliminary Environmental Assessment Study for the Proposed Construction of Charco Dam at Mwamkala Village in Busega District in Simiyu Region



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Preliminary Environmental Assessment for Proposed Construction of Charco Dam at Mwamkala Village in Busega District in Simiyu Region

Declaration

This Preliminary Environmental Assessment report has been prepared by;

Name and Responsibility	Speciality	Signature
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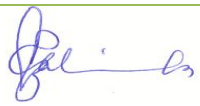
Eng. Patrick C. Valimba – Undertaking assessment of impacts related to water resources	Water Resource Engineer	

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Executive Summary

1. Introduction

Lake Victoria is Africa's largest lake by area, and it is the largest tropical lake in the world and the second largest freshwater lake in the world with a surface area of about 68,000 km^2 located in the proportions of 6%, 43% and 51% in Kenya Uganda and Tanzania respectively. Its catchment area is about 197,500 km^2, extending to Republics of Rwanda and Burundi as well, with a population of more than 30 million people living in the basin. The lake is a major reservoir and source of water for domestic, industrial, hydropower production and commercial purposes. The lake also is a repository for both treated and untreated wastes generated from various activities in the basin.

Over the years, the lake has suffered from increasing pollution as the result of expansion of development activities and an ever increasing population growth in the basin. As part of many initiatives by East Africa community Partner states to control further deterioration of the Lake, LVEMP I activities were planned and implemented around the lake with the first phase ending in December 2005 followed by Phase Two (LVEMP II) in 2009, which is somewhat a compliment and an upscale of LVEMP I Works, with an implementation period of eight (8) years (2009-2013 and 2014-2017).

Busega district like many other active places within the basin, has been contributing its fare share of pollution into the Lake from its people conducting various activities ranging from cultivation to livestock keeping. Mwamkala village in Busega district has a large number of cattle which move all the way to Lake Victoria, Duma and Simiyu Rivers in search of water. These daily movements of livestock cause severe soil erosion and land degradation as well as siltation and eutrophication in Lake Victoria. The village also does not have a reliable source of water for domestic and other uses. In order to reduce the level of pollutants into the Lake, construction of the Charco Dam was proposed as one of the strategy to reduce environmental degradation in the Lake. The proposed project will also provide water for livestock, domestic use, tree nursery and other micro irrigation to the nearby community.

In order to facilitate development of the Charco Dam, an Environmental Impact Assessment was required and in that essence, M/s Environmental BENCHMARK, Consulting Civil-Environmental Engineers of Dar es Salaam were commissioned to carry out an assignment for the proposed project. In line with the EIA and Audit Regulations of 2005, registration of the project with the National Environment Management Council (NEMC) was carried out. Based on NEMC's screening decision and guidance, a Preliminary Environmental Assessment was ordered and its report is hereby prepared.

Study Methodologies

The methodologies used include literature review, consultative meetings with district officials, villagers and village leaders and visual/physical observations through walking in the earmarked project site.

The study had some limitations - sediment data, water requirements for domestic consumption, irrigation and livestock usage were not readily available. Besides this information, there was a need of knowing the evaporation rate and the expected rate of seepage to be able to size the Charco Dam. Since the ESIA team's role was to carry out the

Environmental Impact Assessment, we reasoned that this information was gathered before coming to the design of the respective Charco Dam.

2. Project Description

The proposed Charco Dam is envisaged to be constructed at Mwamkala Village, Nyaluhande ward in Busega district located in Simiyu region. The village is about 18 km east of Magu Township. The expected activities of the Charco Dam will include

a) Site preparation- vegetation clearance to remove any plants or obstruction in the area likely to be inundated or areas to be used for irrigations canals
b) Upgrading the access road (6.5 m wide) to gravel standard to site for supporting heavy machinery
c) Cut, fill and levelling of embankment and reservoir area
d) Materials transport from borrow areas to dam site
e) Actual construction works which will include works on the intake meant for directing water to the reservoir
f) Construction of the canal from the intake to the Charco Dam
g) Construction of the dam and other associated infrastructures
h) Construction of water trough(s) for livestock
i) Landscape and replanting of vegetation

During Operation Phase the project will involve small scale production of food crops such as maize and vegetables and livestock feeding to ensure that household food security and livestock products are improved. Capacity building will also be undertaken to enhance the benefits of the proposed project.

The preliminary design suggests that the Mwamkala Charco Dam will comprise of cattle troughs, small scale irrigation for horticultural activities and water for domestic use. The Charco Dam is designed to trap water from the seasonal stream by constructing the inlet and canal into the Charco Dam. The Charco Dam design capacity is **202,500 m^3** and construction works will take six months to completion.

3. Policy, Administrative and Legal Frameworks

Relevant legislations pertaining to development of Mwamkala Charco Dam project mainly the environmental management in terms of quality, health and safety, pollution of ground and surface water, pollution of soil, land and land use control, forests, wildlife, protection of sensitive areas, protection of endangered species among others, were examined in order to ensure that the proposed development project meets and abides by the existing regulations. In this section, a full analysis of different policies, administrative and legal frameworks and relevant international treaties, conventions and World Bank safeguard policies as they apply to this project have been discussed.

4. Baseline Conditions

Busega district experiences the minimum and maximum temperatures ranges between 18^{0}C to 30^0 C during the dry season. The annual rainfall is bi-modal with the short rains in October to December. The heavy rains occur in March to May. Annual rainfall ranges from 700mm to 1,000 mm. The project area has black cotton soil.

The situation of housing in the study area exhibits typical rural infrastructure. About 62 percent of houses in the villages are semi permanent constructed by poles and mud bricks, thatched with grass; 31 percent of houses are permanent with mud bricks and roofed by galvanized sheets while the remained 7 percent comprises of houses made of cement bricks, with cement floor, plaster and roofed with iron sheets.

Mwamkala village has a total population of 3,941 of which 1,926 are men and 2,015 are women with a total number of 567 households.

Generally the area around the project is used for agricultural purposes. The neighbouring land is occupied by individual farms such as for sweet potatoes, millet, maize, cotton, rice and groundnuts.

Mwamkala village communities have no community piped water supply; they depend on underground water resources and surface water (tributaries). The village has 5 tributaries and fifteen (15) shallow wells of which only eighty (8) are working.

The villagers of Mwamkala deal with agricultural activities. Mwamkala village has 4,132 cattle, 3,792 goats and 1,015 sheep.

The Charco Dam development falls within an area that is not protected from human activities and therefore no special ecological feature was noted due to the diversity of activities carried out in the catchment.

5. Stakeholders' Involvements

Stakeholders' consultation involved the necessary potential Interested and Affected Parties (I&APs). The comments received and issues raised from these public participation exercises have been incorporated into the PEA report and used in determining mitigation measures for the project.

Issues pertaining to construction of the Charco Dam and its environmental and social consequences were discussed with the key stakeholders and interested members of the communities in the vicinity of project area in Busega district. Among the issues raised from the public meeting at Mwamkala village is the requirement of the Charco Dam to be of sufficient depth and strong embankment so that it can hold water throughout the year

People in the study area are eager to get the dam constructed. Such feelings emanate from their expectation that the dam will bring the following advantages to their localities:

- Constant water supply for cattle and irrigation and for domestic use
- Availability of water will reduce dependence in Simiyu River where cattle are taken for water and eventually contaminate the water.
- Fishing may be introduced and add both nutritious food and income
- During dam construction there will be employment opportunities to local people
- Stimulation of technology and skills is another positive impact. There will be interaction and exchange of technology between the local people and the new immigrants hence stimulate the adoption of new technologies.
- Generally, the construction of the dam will have tremendous positive impacts on the village and district economy and the entire nation.

6. Identification of Impacts and Corresponding Mitigation Measures

In any development project, a number of minor to major environmental impacts are likely to occur. For this project, the impacts arise from the planned activities ranging from site clearance to transportation of construction materials, construction and operation phases.
Identified positive impacts include Reliable supply of drinking water for livestock, domestic purpose, and irrigation water, increased production of crops, increased income, poverty alleviation and food security, opportunities for temporary employment and creation of new businesses opportunities at the construction site.

Identified negative impacts and corresponding mitigation measures were

i. Loss of Land - Fair and prompt compensation (to those who will provide their land for the project requirements e.g. for borrow sites) to all affected persons.
ii. Loss of natural aesthetic value-Avoid unnecessary clearance of trees and vegetation covers near the embankment or borrow sites. Vegetation clearance limited to areas which will receive permanent works and sensitization of the communities
iii. Generation of solid waste -site housekeeping, allocation of special areas for petty business and provided with garbage bins.
iv. Land scarring due to cut and fill materials - materials will be sourced from exiting borrow areas and once these borrow pits are no longer in use, they will be backfilled with the spoil or made as water storage points for livestock. The edges of these pits will be smoothened to avoid posing risks to children and livestock. Also borrow pits sides will be landscaped after work completion.
v. Soil erosion - Implementation of erosion control measures in the water shed- these measures will involve planting vegetation such as grasses, terracing in steep slopes, gully construction and control, creating a buffer zone for the dam, applying rip -rap technique, fencing the dam's buffer zone and planting sisal around the buffer zone and securing available vegetated land area.
vi. Soil pollution during civil work construction -Use vehicles which are in sound conditions i.e. those without fuel and oil leakages, Good selection of vehicle routes in order to avoid passing through agricultural fields.
vii. Air pollution from dust and fumes during civil work construction -Water sprinkling in dusty areas to reduce the dust, use of dust masks and goggles by operators and those working in dusty areas will help to help to minimize air pollution.
viii. Noise pollution during civil work construction **-**Where the noise level is beyond 85 dB(A), ear muffs or plugs shall be provided to all those either operating or working within the construction site. Equipment shall be well maintained or fitted with noise silencers such as mufflers.
ix. Contamination of water such as from leakages of fuels and lubricants from the construction equipments, fertilizers and poor hygiene - machines will be properly serviced and checked to make sure that they do not leak.
x. **Involvement of child labour -** Conduct sensitization and awareness to communities in relation to child labour and truancy. Ensure that casual labours are recognized by village/*sub-village* government leaders in order to avoid/combat child labour during construction phase.

Impacts during the Operation Phase and corresponding mitigation measures

i. Increase in water related diseases - Constant variations on water level, water surface agitation, control of aquatic vegetation in the reservoir and improvement of sanitation condition especially at the upstream side. During the campaigns on prevention and control of HIV/AIDS, the community will be educated on

transmission and prevention of diseases such as water related diseases, water borne diseases and faecal oral routes etc. A fish, *Tilapia Nilotica that* feeds on mosquito larvae can be raised in the proposed Charco Dam to reduce the risk of malaria. Mudfish, which can survive even when small dams dry up, can also be raised to increase food supply and cash income to the respective community.

ii. Soil erosion and siltation of the dam reservoir - The design for the troughs should consider the issue of soil erosion and thus construct erosion control structures especially along the livestock routes to and from the dam/trough.

iii. Soil Salinity -Design system that allows leaching of salts with excess water, Alternate irrigation methods and schedule, Adjust crop patterns (fallow times, crop selection etc,.) to prevent salt build up, Consult soil scientist for using soil additives (say addition of gypsum before irrigation), Use of salt tolerant crops.

iv. Dam Breach (uncontrolled flooding)- Proper detailed engineering design and sound construction of the dam by a reputable contractor is the answer.

v. Water Logging - Supply of water according to the demand of plants, Management of water and maintenance of the irrigation systems.

vi. Loss of Natural Habitat - Close supervision of earthworks shall be observed in order to confine land clearance within the proposed dam reserve boundaries. Topsoil shall be stockpiled and used for reinstating flora along the buffer zone.

vii. Risk of health and Safety Measures of Workers and Local Community - Injuries and health problems associated with construction and use of the Charco Dam will be reduced through the implementation of the workers health, safety and first aid training programs.

viii. Risk to life - Proper dam design with fencing material to control children from entering the reservoir for swimming will help to solve the problem.

Economic and Socio-Cultural Impacts to Local Community

i. Influence on community life style

The construction of the Mwamkala Charco Dam, particularly use of the Charco Dam in agricultural activities will have a significant impact on the day to day lives of Nyaluhande ward Community such as increase in cost of living due to influx of workers and those migrating *(induced settlement* and *in-migration)* especially livestock keepers in the area due to improved life conditions including availability of drinking water for cattle. In case this happens then the communities may be more likely to exhibit behaviour that puts them at high risk for HIV/AIDS.

Mitigation measures will include

- Sensitization of the communities to know impending cultural threats and put them in a state of preparedness to deal with new life
- Village to introduce own by-laws and strictly follow them to avoid cultural impacts
- Along with project implementation, measures to reduce such influences must be introduced e.g. training, information, strengthening of village/institutional organization structures etc.

ii. Increased crime and social conflict – The village government and the Water User Committee will help to solve conflicts.

iii. Water user and land conflicts The village community to hold a meeting and agree on the modality of sharing the little land resource available. The Water User Committee will be operating all issues relating to water.

7. Assessment of the Significance of Impacts

The project impacts identified were analysed into different categories based on the stakeholders' views and perceptions, the consultants experience in undertaking Environmental Impact Assessments and experience gained in other projects of a similar nature. The approach used to assess the significance of the potential impacts and later assess the effectiveness of the mitigation or enhancement measures is to apply significant ratings to each impact based on objective criteria such as magnitude, extent and duration of that impact, to yield a final evaluation of the significance of impacts before and after mitigation measures are applied.

Also other important criteria considered to evaluate whether or not adverse impacts are significant include:

- environmental loss and deterioration;
- social impacts resulting directly or indirectly from environmental change;
- non-conformity with environmental standards, objectives and guidelines; and
- Likelihood and acceptability of risk.
- Criteria to evaluate adverse impacts on natural resources, ecological functions or designated areas include:
- reductions in species diversity;
- depletion or fragmentation on plant and animal habitat;
- loss of threatened, rare or endangered species;
- Impairment of ecological integrity, resilience or health e.g.
- disruption of food chains;
- decline in species population;
- alteration in predator-prey relationships.

8. Project Alternatives

It should be noted that during site assessment, location alternatives was limited to those areas in close proximity to existing project site where the opportunities and use of collected water could be maximized on the downstream side. Therefore the options considered are location and placement, input and design and do-nothing option alternatives.

The aim of the project is to provide water for community domestic use, water for small scale irrigation and water for livestock drinking. In view of the above requirement, it should be noted that during site investigation, the investigation on project site/location alternatives was limited to the earmarked existing location specifically based on land allocation and ownership according to the village land use plan.

Therefore, Environmental BENCHMARK recommends that the construction of the proposed Charco Dam on the proposed site (i.e. Option 2) should proceed on the condition that proper planning is implemented and the construction activities adhere to all the proposed mitigation measures detailed in this report. This precautionary approach will reduce the impact on the ecological systems in the area.

9. Environmental and Social Management Plans

In Tanzania the Environmental Assessment framework is guided by the following two key national legislations; The Environmental Management Act (EMA) No. 20 (Cap 191) of 2004 and the Environmental Impact Assessment and Audit regulations, 2005. Environmental

Impact Assessment for any development project is administered and approved by the Vice Presidents' Office, where the Minister for Environment falls. Therefore for environmental assessments for the proposed project, the responsible institutions are Minister for Environment who approves the EIA and gives the environmental permit, and NEMC, who arranges for EIAs, undertakes enforcement, compliance, review and monitoring of EIA.

The project proponent is the Ministry of Water who will be assisted by the Designers and Supervisors from Busega District Council.

The reporting arrangement of the EMP will include the Environmental Representative from Busega District Council cooperating with other experts such as District Land Officers, District Valuers and Community Development Officers to provide the Regional Environmental Management Expert with environmental reports of the project implementation as part of the progress reports and annual environmental monitoring reports. The Regional Management Expert is the link person between the region and the Director of Environment as well as the Director General of NEMC. The estimated cost for implementation of the ESMP besides the environmental civil works contained in the BOQ is estimated to cost TZS 6,540,000.

10. Environmental and Social Monitoring Plans

Monitoring is the long-term process that normally begins at the start of the project and should continue throughout the life of the project. Its purpose is to establish benchmarks so that the nature and magnitude of anticipated environmental impacts are continually assessed.

Since the project is divided into three distinct phases, design, construction and operation, the proponent will prepare an environmental management plan which will cover the construction phase of the Mwamkala Charco Dam. In the construction phase, there are stages that include mobilization, construction, commissioning, demobilization and a fixed operational monitoring during the defects liability period. The issues to be monitored during the different phases of the project have also been presented.

On the reporting arrangements, the contractors' appointees to deal with Environmental Management will cooperate with District Environmental Officers and other sectoral officers in Busega District to provide the Regional Environment Office with environmental reports of the project implementation as part of the progress reports and annual environmental monitoring reports. The Regional Environment Office will be the link between the project and the National Environment Management Council and the Department of Environment under Vice President's Office.

The regulatory authorities at the District level have to see to it that the commitments made by the project proponent through mitigation measures are really put into practice and the report sent to NEMC and that is the essence of this environmental and Social Monitoring Plan as presented with an estimated monitoring budget of TZS 4,300,000.

11. Summary and Conclusion

After submission of this report, the project beneficiaries are looking forward to the decision to be made by NEMC. If NEMC is satisfied that the Charco Dam project shall not have significant negative impacts on the environment and the community, or that the information provided in PEA report discloses sufficient mitigation measures, it may proceed to

recommend to the Minister to approve the project so that subsequent project activities may continue.

In identification of the environmental and social studies, the consultants carried out field surveys to collect the environmental and social information and also discussed with the local authorities concerning the environmental and social impacts of the Charco Dam project.

This project is essential for the residents of Mwamkala as they expect to benefit in the fields of livestock keeping, micro irrigation, water for domestic purposes and other uses of water for daily life.

More concentration will be made by the contractor and the designer on the design of the area surrounding the cattle troughs so that the drinking area is protected from soil erosion.

The project is estimated to cost a sum of Tanzania Shillings Fifty Nine Million and Nine Hundred and Twenty Thousand and Six Hundred and Sixty Three (TZS 59,920,663).

Mwamkala villagers will form the Water User Committee which will work under guidance of Busega district council authority; the committee will be managing all activities of the project. In case the committee meet the crucial challenge, then it should report to the district authority.

Acknowledgements

A range of individuals have made this Preliminary Environmental Assessment possible through their commitment in terms of time and effort. The LVEMP II is grateful to all those who contributed in one way or another to this assessment in particular the ESIA Team Leader Eng. Venant RWENYAGIRA, Environmental Engineer Sanjo Mgeta, Water Resources Engineer, Eng P. Valimba, Sociologists Mr. Huruma Kisaka and Ms. Haikael Mfangavo and Assistant Environmental assessment expert, GEng. Weisiko M. Magoto and the ESIA team driver, Mr. Ladslaus Kamugisha Mayowa, all from Environmental Benchmark Consulting Civil-Environmental Engineers.

The LVEMP II is as well grateful to the Busega district authorities and Mwamkala village authorities for their support during the assessment.

The LVEMP II is greatly indebted to all villagers of Mwamkala for their time to participate in public consultation process and provide immeasurable input into this work. The support of various staffs from different government institutions, private companies, non-governmental organizations, who at different stages of the study were involved in supplying relevant information to the study team, is highly appreciated.

Acronyms and Abbreviations

CBO	Community Based Organisations
DEMO	District Environmental Management Officer
DIO	District Irrigation Officer
DLO	District Land Officer
EAC	East Africa Community
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
GEF	Global Environmental Facility
GER	Gross Enrolment Rate
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome
I&APS	Interested and Affected Parties
IPM	Integrated Pest Management
IUCN	The World Conservation Union
IVM	Integrated Vector Management
LVB	Lake Victoria Basin
LVEMP I	Lake Victoria Environmental Management Project Phase One
LVEMP II	Lake Victoria Environmental Management Project Phase Two
LVBC	Lake Victoria Basin Commission
MEAs	Multilateral Environmental Agreements
NAWAPO	National Water Policy
NEMC	National Environment Management Council
NEP	National Environmental Policy
NGO	Non-Governmental Organization
NLUC	National Land Use Commission
NSGRP	National Strategy for Growth and Reduction of Poverty
PEA	Preliminary Environmental Assessment
PLHAs	People Living with HIV/AIDs
RPCT	Regional Project Coordination Team
SACCOS	Savings and Credit Co operative Society
SIDA	Swedish International Development Agency
SUMATRA	Surface and Marine Transport Regulatory Authority
STDs	Sexually Transmitted Diseases
TOR	Terms of Reference
VP	Vice President
WDC	Ward Development Council
WUGs	Water User Groups

1. Introduction

1.1 Project Background and Justification

Lake Victoria has the surface area of about 68,000 km^2. It is Africa's largest lake by area, and the largest tropical lake in the world. Lake Victoria is the world's second largest freshwater lake by surface area; only Lake Superior in North America is larger. In terms of its volume, Lake Victoria is the world's ninth largest continental lake; it contains about 2,750 cubic kilometres of water.

Lake Victoria is shared in the proportions of 6%, 43% and 51% by Kenya, Uganda and Tanzania respectively. Its catchment area is about 197,500 km^2, extending to Republics of Rwanda and Burundi as well, with a population of more than 30 million people living in the basin. This is the largest inland water and fishery sanctuary in East Africa, with an estimate annual fish catch of about 750,000 metric tonnes and an inland water transport linkage for the three East African states. Furthermore, the lake is a major reservoir and source of water for domestic, industrial, hydropower production and commercial purposes. The lake also is a repository for both treated and untreated wastes generated from various activities in the basin, some of which can alternatively be reused for valuable activities such as agriculture.

Over the years, the lake has suffered from increasing pollution as the result of expansion of development activities and an ever increasing population growth in the Lake Victoria basin.

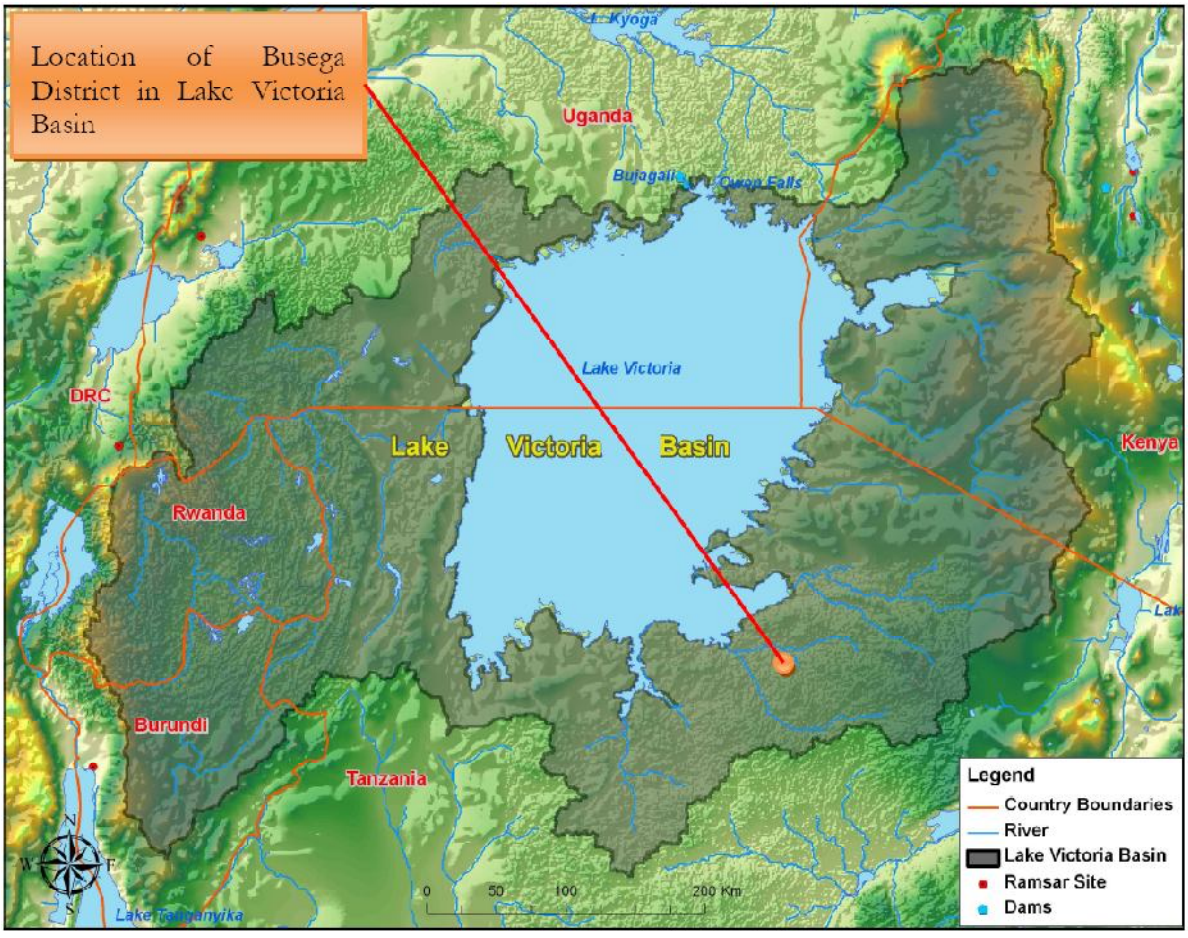

Figure 1: Lake Victoria Basin showing the approximate location of the project area

As part of many initiatives by East Africa community Partner states to control further deterioration of the Lake, LVEMP I activities were planned and implemented around Lake Victoria. The first phase ended in December 2005 followed by Lake Victoria Environmental Management Project Phase Two (LVEMP II) in 2009, which is somewhat a compliment and an upscale of LVEMP I Works, with an implementation period of eight (8) years (2009-2013 and 2014-2017).

Again, this phase II is equally a regional initiative and a multi-sectoral approach on the management of the Lake Victoria Basin implemented in the five East African Community (EAC) Partner States, Burundi, Kenya, Rwanda, Tanzania and Uganda. Lake Victoria Basin Commission (LVBC) coordinates the project regionally through the Regional Project Coordination Team (RPCT) based in Kisumu, Kenya. The Ministry of Water is the focal point ministry on the Tanzanian side. In Tanzania the project became effective on 20th August 2009, covering a total of 23 districts in Mara, Simiyu, Geita, Mwanza and Kagera Regions. The Project is funded by the World Bank, Global Environmental Facility (GEF), Swedish International Development Agency (SIDA), Government of Tanzania and Communities.
During LVEMP I, it was observed that many rivers and streams flowing into Lake Victoria and the near-shore areas are heavily polluted, particularly by;

(a) Raw and partially treated municipal and industrial effluents;
(b) Contaminated urban surface runoff;
(c) Unsanitary conditions of the shoreline settlements; and
(d) Pollutants carried in eroded sediments, particularly nitrogen (N) and phosphorus (P).

The sources of pollutants to Lake Victoria are from various places and activities within the Lake Victoria catchment, Busega district inclusive. Busega has been contributing its fare share of pollution into the Lake from its people conducting various activities ranging from cultivation to livestock keeping. Mwamkala village has a large number of cattle which move all the way to Lake Victoria and Duma and Simiyu Rivers in search of water. These daily movements of large herds of livestock cause severe soil erosion and land degradation as well as siltation and eutrophication in Lake Victoria. The village also does not have a reliable source of water for domestic use as a result the villagers walk more than 400m to access water.

In order to reduce the level of pollutants into the Lake, LVEMP II proposed construction of the Charco Dam as one of the strategy to reduce environmental degradation in the Lake through reducing concentration of livestock and human activities in the catchments of Mata, Duma and Simiyu Rivers. The proposed project will also provide water for livestock, domestic use, tree nursery and other micro irrigation to the nearby community.

Therefore, the overall objective of the proposed Charco Dam construction is to contribute towards achieving the vision of the EAC of "creating a prosperous population living in a healthy and sustainable managed environment and providing equitable opportunities and benefits"

In order to facilitate carrying out of Preliminary Environmental Assessment for LVEMP II works, the Ministry of Water commissioned M/s Environmental BENCHMARK, Consulting Civil-Environmental Engineers of Dar es Salaam, to carry out an assignment for the proposed Mwamkala Chaco dam.

In line with the EIA and Audit Regulations of 2005, Part III- particularly regulation 6, registration of the project with the National Environment Management Council (NEMC) was carried out through preparation and submission of the Project Brief and EIA forms. NEMC's screening decision instructed the proponent to undertake the Preliminary Environmental Assessment study. Based on this screening decision and guidance from NEMC, a Preliminary Environmental Assessment report is hereby prepared, containing among other things, the following:

i. Description of the project characteristics and the affected environment;
ii. Identification of impacts on the local environment ; and
iii. Assessment of the impacts in terms of energy flow, effects on sensitive ecosystems relative to the baseline state and socio-economic impacts;
iv. Design layout of the Charco Dam and the canal
v. Concerns from relevant stakeholders
vi. Legal framework
vii. Identification of impacts on the local environment
viii. Environmental and Social Management and Monitoring Plans

1.2 Purpose of Undertaking Preliminary Environmental Assessment

The principal objectives of the preliminary environmental assessment study are to identify and investigate the most significant environmental and social impacts and address socio-economic issues likely to emanate from the Mwamkala Charco Dam construction and its use in order to help NEMC in making decision. If NEMC is satisfied that the project shall not have significant negative impacts on the environment, or that the information provided discloses sufficient mitigation measures, it may proceed to recommend to the Minister to approve the project. Where NEMC finds that the project shall have significant impact on the environment and that the project preliminary report discloses no sufficient mitigation measures, it shall require the proponent to undertake a full environmental impact assessment.

The study also is aimed at ascertaining and updating the socio-economic implications likely to result in from the proposed Mwamkala Charco Dam construction including:

- Improving the understanding of the local communities in identification, assessment or evaluation of the significance of the impacts of the dam on the communities, in agriculture, trade and commerce.
- Effecting and creating a sense of local participation and ownership in the project from design, construction to operation.
- Identifying institutional capacities to implement HIV/AIDS education and information in the project area.

1.3 Study Methodologies

The methodologies used in this include literature reviews, consultative meetings with district officials, villagers and village leaders and visual/physical observations through walking in the earmarked project site. Thus the following approaches/ techniques were used in data collection.

In-depth discussions with key informants

In-depth discussions with key informants were conducted to key informants such as village leaders at Mwamkala, District officials and other influential people in the project area, while public consultation meeting was held with Mwamkala villagers.

Public Consultative meetings

Public meetings were held with Mwamkala village members whereby issues related to construction of charco-dam were raised as indicated in the section of Public Involvements.

Visual observation

Observation was made through transects walks the consultants observed among other things housing and associated sanitation infrastructure such as toilets, water drawing points, business infrastructure, settlement patterns and other economic activities such as farming and animal husbandry.

Literature review

Documents and records were reviewed to obtain existing secondary data and information relevant to the study. The major source of such information includes district socio-economic and investment profiles, education, health and community development reports, The National 2002 Population Census and Settlement Development and other relevant reports.

Inception Report Meeting

The consultant prepared an inception report which was presented to the project stakeholders that involved technical experts from various institutions in Lake Victoria Basin and regulatory and enforcement bodies such as NEMC. The objectives of the inception report presentation and review was to provide inputs into the environmental impact assessment of this project.

1.4 Study Limitations

1.4.1 Sediment Data-

Soil erosion can be quantified by checking the quantity of sediments in the flowing water. Bed load, suspended load and dissolved solids are the major part of the sediments in the flowing water. Due to limitations and nature of the assessment (preliminary), only models such as East African Flood Model can be used to ascertain the amount of sediments.

Also for better values of sediment determination, samples for analysis must be taken when there are no artificial contributions of sediment loads in the catchment. In addition to this the time of sampling must be extended to longer periods, in order to check sediment variations throughout the year and also capture dry and wet cycles. Since the study was limited to one and half months, it was not possible to arrange for sediment load measurements.

1.4.2 Water Requirements

To estimate how much water is required and for how long, some simple calculations are required to be able to know the size of the Charco Dam required. The demand for water for domestic purposes, livestock and irrigation can be estimated based on the following considerations.

Water for domestic requirement -In this case we assume that the stored water will be needed for a dry season of say 170 days in a year, although this figure may vary in different

localities. Based on the per capita consumption of 20 litres per day; we have the following calculations

3940 capita x (20 litres/capita/day) x 170 dry days = 13,396,000 litres

Water for Irrigation

It is difficult to estimate the water requirement for irrigation because it depends on the type of irrigation method used, the soil type, climate, crop type and its growing period. For example, bucket irrigation of vegetables requires about double the volume of water required for drip irrigation, etc, therefore this information was missing

Water for Livestock

The amount of water required by livestock will vary greatly depending on the season, temperature, moisture content of animal forage and type of animals. The following adopted from Finkel and Segerros 1995, shows the dry season requirements for various common types of livestock.

Table 1: Example of water requirement for livestock

Type of Livestock	Daily consumption per animal (l)	Number of days without rain (days)	Total Water requirement (l)
Milk cow	25	170	4250
Zebu cow	12	170	2040
Sheep	5	170	850
Goat	3	170	510
Total water requirement for different types of livestock			7,650

Besides the information on water requirement, there was a need of knowing the evaporation rate and the expected rate of seepage to be able to size the Charco Dam. Unfortunately the data of this type was required, in order to come to some conclusion but they could avail this information.

Since the ESIA team's role was to carry out the Environmental Impact Assessment, we reasoned that this information was gathered before coming to the design of the respective Charco Dam

2. Project Description

2.1 Objective of the project

The overall objective of LVEMP II is to contribute towards achieving the vision of the EAC for the Lake Victoria Basin (LVB) of "having a prosperous population living in a healthy and sustainably managed environment, with equitable opportunities and benefits"

The specific objectives of constructing the dam include but not limited to the following:

- Reduce the environmental impacts caused by cattle and human activities along Mata, Duma and Simiyu Rivers
- Enhance environmental awareness in the community
- Create employment in the community
- Improve living standards of Mwamkala villagers
- Increase availability of water for livestock, human consumption and for irrigation in small scale horticultural activities in the village.

2.2 Project location

The proposed Charco Dam is envisaged to be constructed at Mwamkala Village, Nyaluhande ward in Busega district located in Simiyu region. The village is about 18 km east of Magu Township. Busega district is one of the five districts forming Simiyu region; some other districts include Maswa, Itilima , Bariadi and Meatu.

On the eastern side the site is bordered by Mwamkala Primary School, on the western side by paddy field, on the northern and southern sides it is bordered by rocky outcrops and hills. The approximate location of the project area is shown on the following map.

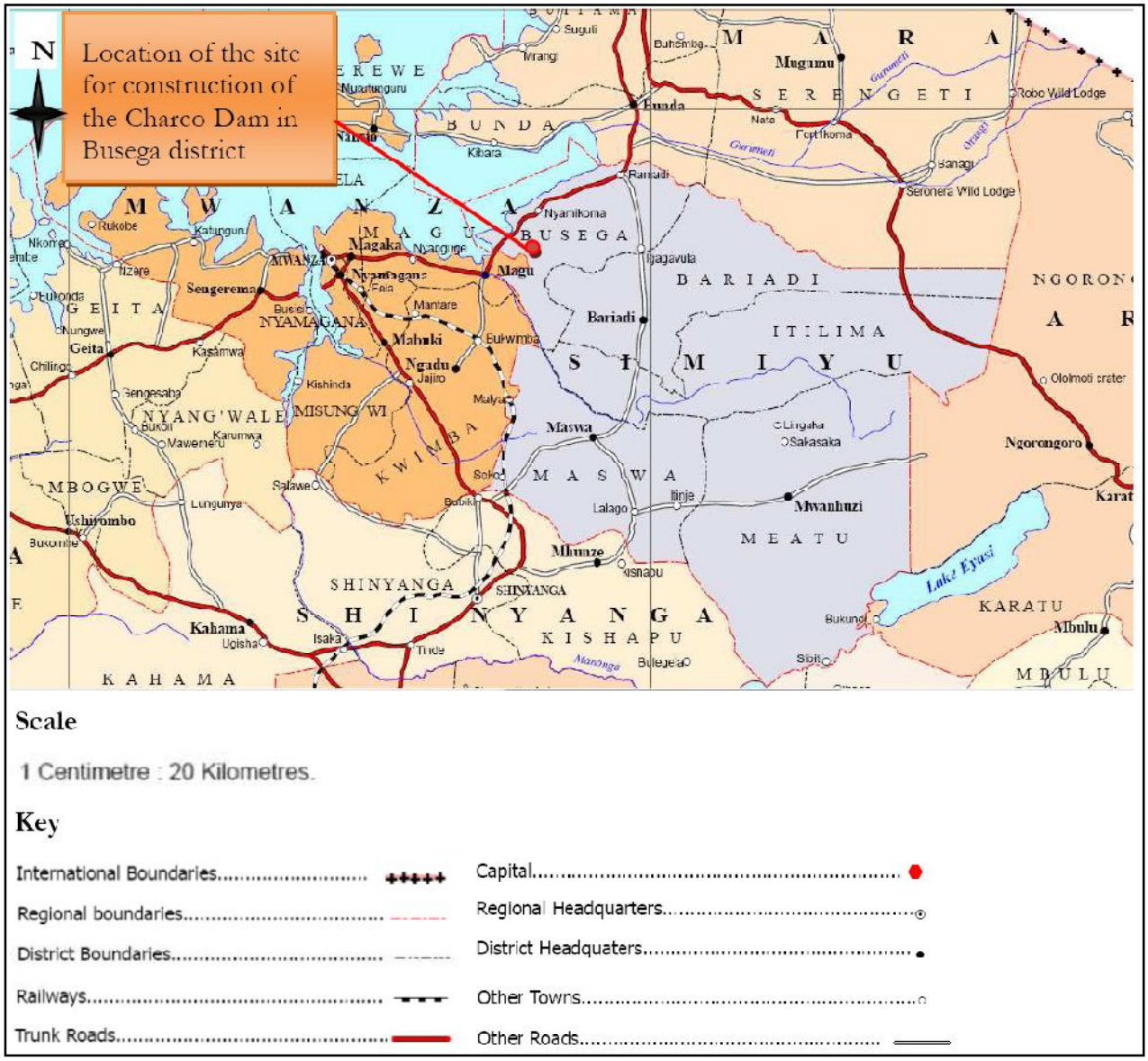

Figure 2: Part of Administrative Map of Tanzania showing the location of Busega district in Simiyu region where the proposed Charco Dam will be constructed

2.3 Project Activities

2.3.1 During Construction phase

The Mwamkala Charco Dam which is the expected source of water for livestock, small scale irrigation and domestic use will be constructed to meet the requirements of the residents. Once the contractor of the Mwamkala Charco Dam is secured and contract modalities are finalized, the contractor will proceed to prepare the site for works which will involve:

j) Site preparation- vegetation clearance to remove any plants or obstruction in the area likely to be inundated or areas to be used for irrigations canals
k) Upgrading the access road to site for supporting heavy machinery
l) Cut, fill and levelling of embankment and reservoir area
m) Materials transport from borrow areas to dam site
n) Actual construction works which will include works on the intake meant for directing water to the reservoir
o) Construction of the canal from the intake to the Charco Dam

p) Construction of the dam and other associated infrastructures
q) Construction of water trough(s) for livestock
r) Landscape and replanting of vegetation

The lining of secondary canal and associated water distribution and control structures to enable those undertaking horticultural activities, excavation of drainage ditches, and spillway protection works for the dam will be needed for prolonged life.

Another activity which was not stated but likely to take place in the Charco Dam is aquaculture. This is anticipated because the residents of Busega are close to Lake Victoria through which they benefit in fishing which is part of the employment opportunity for many people, thus, introduction of fish species in the dam is among the expected outcomes. The beneficiaries will need consultancy service to know the type of fish which can be introduced in the reservoir.
The construction phase will require about 18 labourers.

2.3.2 During Operation Phase

Cultivation and livestock keeping
Production of food crops and livestock feeding will be given a high priority in order to ensure that household food security and livestock products are achieved. Some of the food crops cultivated in the area are such as, maize, sweet potatoes, groundnuts, sorghum and cotton.

Capacity Building
Capacity building will also be undertaken to enhance the benefits of the proposed project. Capacity building will comprise of activities such as farmers training, awareness creation, seminars and workshops to district authorities and beneficiaries. Other activities are study tours, follow ups and supervision of the ongoing project activities. The training will include:

- Irrigation and livestock water management
- Operation and maintenance of the Charco Dam and irrigation infrastructures
- Catchment/ water source protection and management
- Choice of crop varieties to be grown
- Improved crop husbandry practices, including fertilizer management, soil conservation and organic farming
- Appropriate plant protection
- Agri-business, choice of high value crops, credit possibilities, management and market opportunities
- Effect of nutrient mining and role of organic manure on crop growth
- Post harvest handling. (It is proposed that these aspects will be covered in irrigation extension and training programs).
- Health education on disease transmission (especially the deadly disease HIV/AIDS) and prevention of water-borne diseases such as schistosomiasis, typhoid, cholera.

2.3.3 During Decommissioning Phase

Dam's and canals' life
The demand of the Mwamkala villagers is the dam for livestock, domestic and agricultural activities. These demands can be met if the dam and its reservoir and associated infrastructure are well protected, as dam's embankment and their supporting structures continue wearing out through loss of soil or receiving sediments during their life time. In view of these activities, decommissioning of the project is not seen as a priority rather than

concentrated efforts geared towards prolonged life of the dam. Instead of planning for abandoning the dam, strict plans will be made for maintaining the structures to have prolonged life.

2.4 Preliminary Design of the Project

The preliminary design suggests that the Mwamkala Charco Dam will be comprised of a cattle trough, small scale irrigation for horticultural activities and water for domestic use.
The Charco Dam is designed to trap water from the seasonal stream by constructing the inlet and canal into the Charco Dam. The Charco Dam design capacity is 202,500 m^3 within estimated three hectares of land, and the construction works will take up to six months to completion.

The drawings for the dam and the information extracted from the drawings are presented below:

i. Height of the dam embankment = 4m
ii. Top width of the embankment = 4m
iii. Bottom width of the embankment = 12m

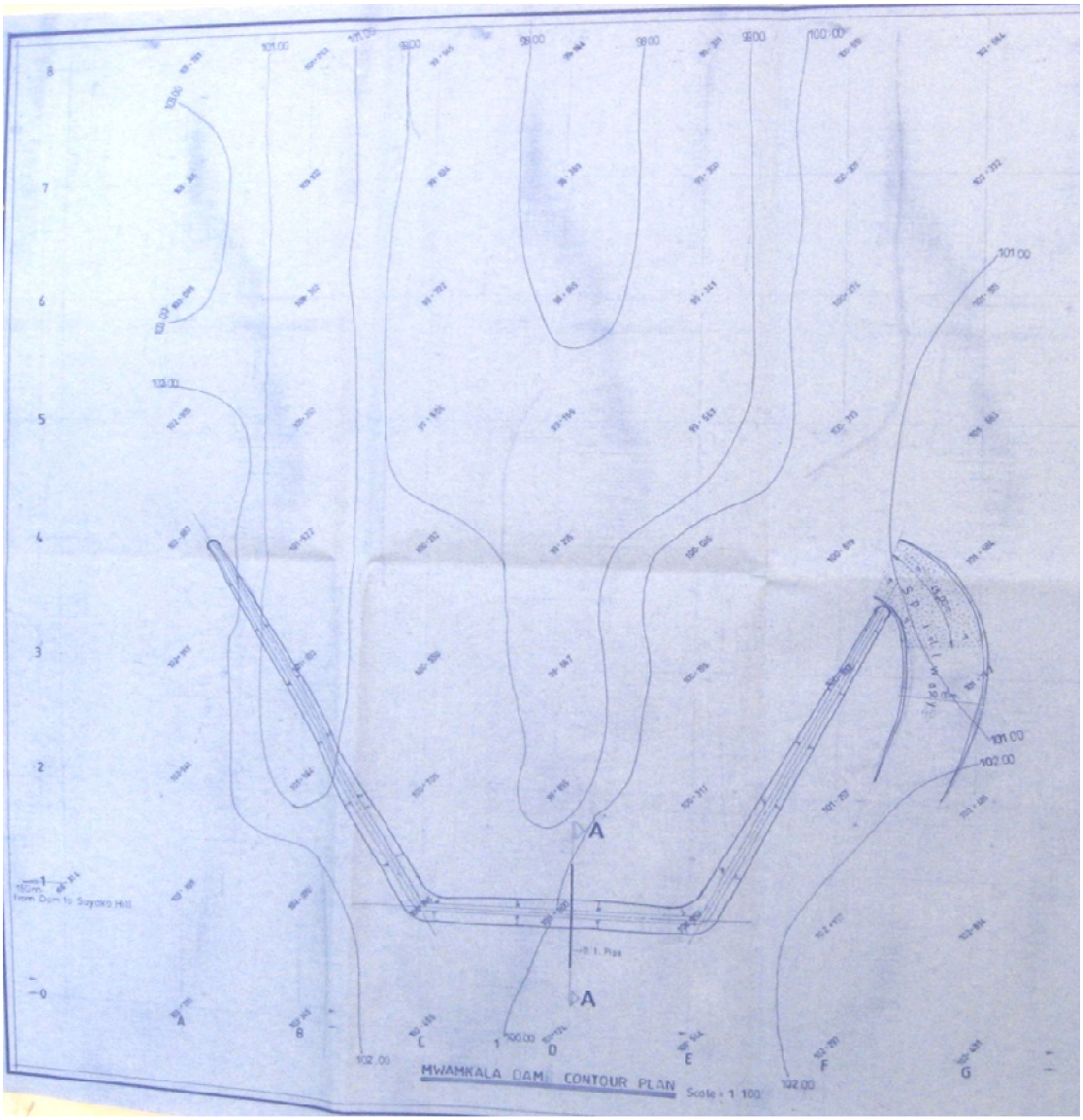

Figure 3: Contoured layout plan of Mwamkala Charco Dam

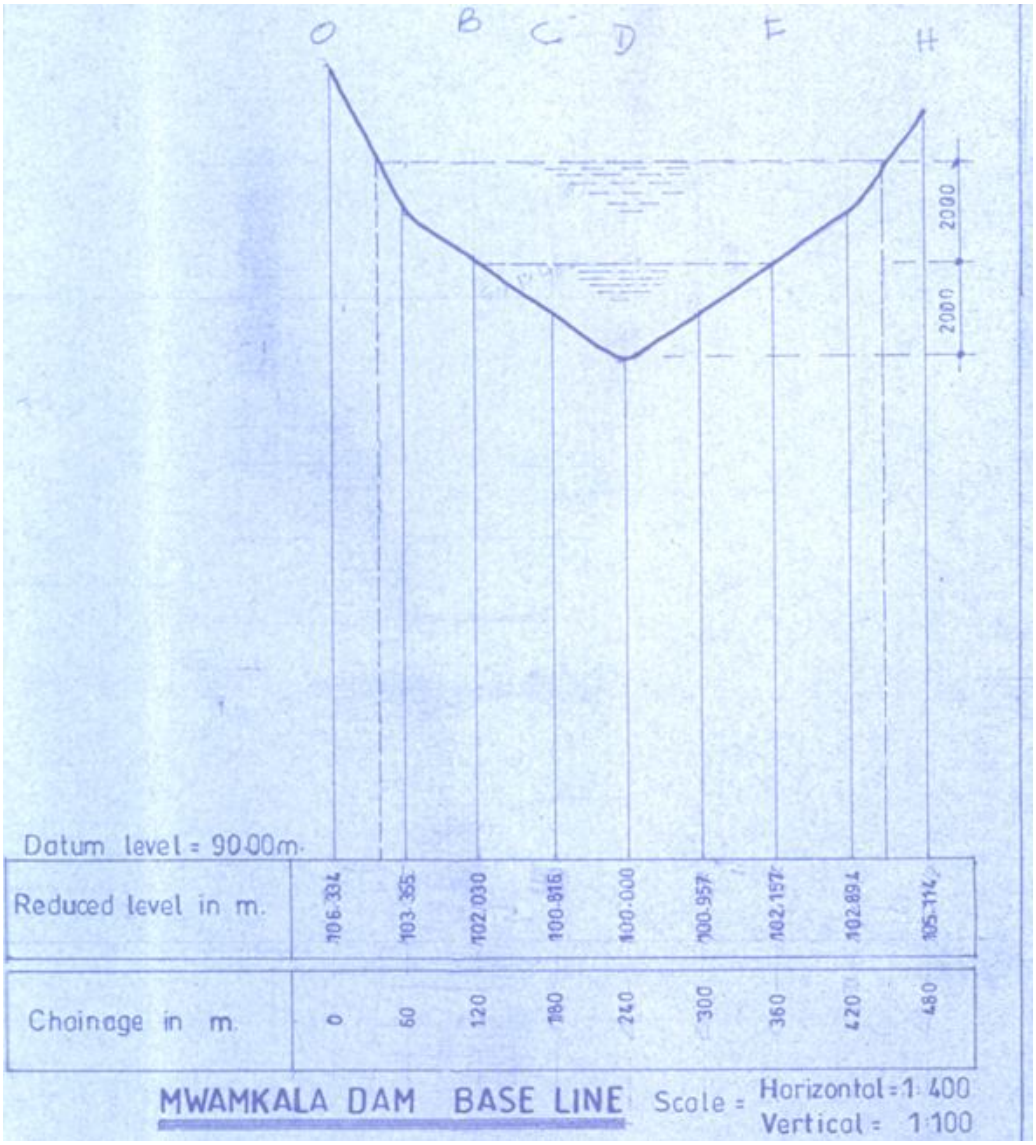

Figure 4: Longitudinal section of Mwamkala dam and expected level of water in the dam as extracted from Figure 3

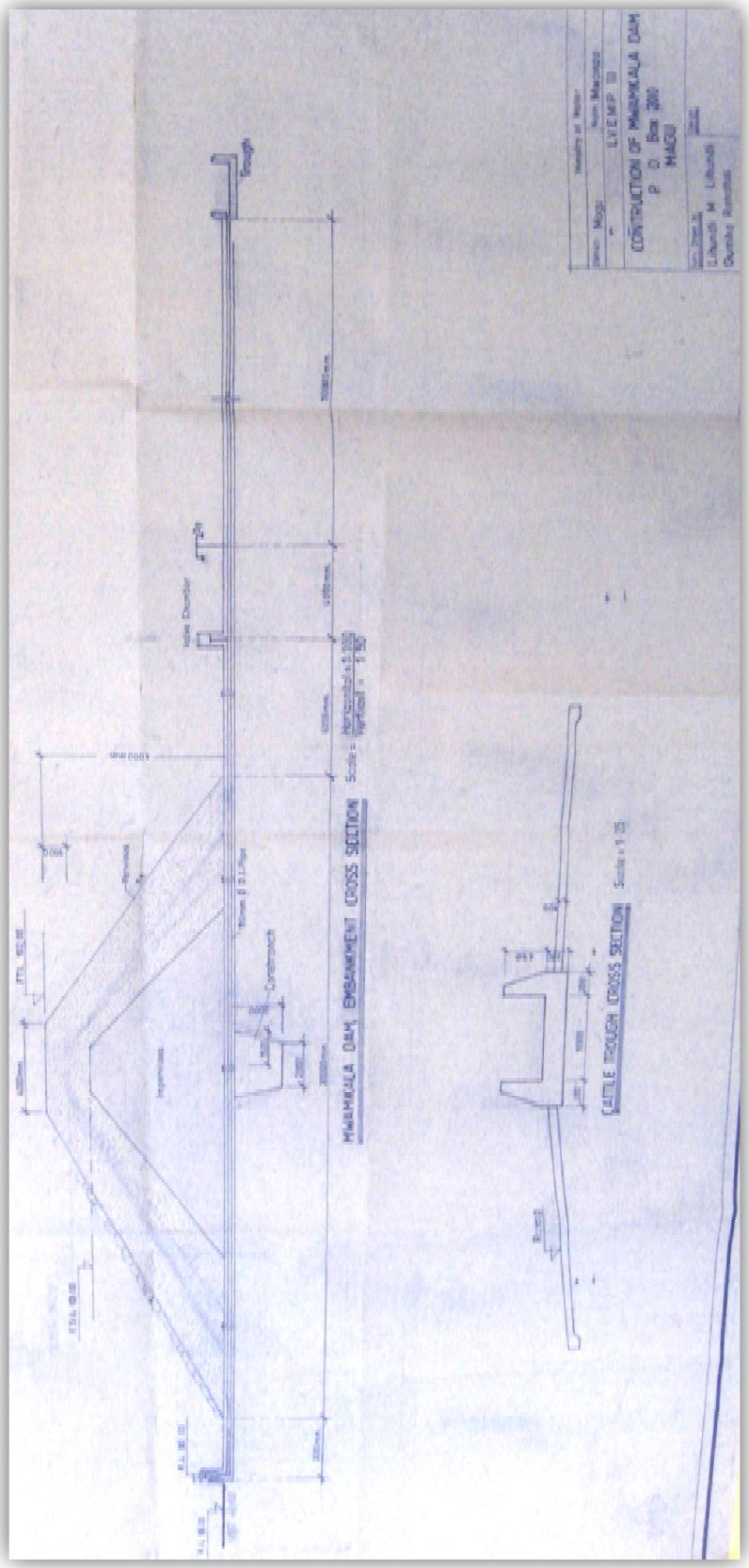

Figure 5: Cross section of the Mwamkala Charco Dam embankment

2.5 Project Requirements

The project will require various locally available construction materials for construction works of the Charco Dam. Such locally available materials required for road works include murram or gravel, aggregates or crushed stones, building sands, clay, timber and water.

2.5.1 Aggregates for Works

Aggregates or crushed stones will be obtained away from the project site and transported to the site; in this case the contractor will procure aggregates from the local producers and transport them by trucks to the project site.

2.5.2 Gravel

Gravel or murram will equally be obtained from the existing borrow pits or establishing the new ones near to the proposed project site. Since heavy machines such as the front wheel loaders and bulldozers will be based at these borrow pits, there might be some off site investment in terms of facilities for storage of fuel to run the equipment.

2.5.3 Soil for Charco Dam walls - Clayey Soil and Sandy soil.

Before the Charco Dam wall is made during the design phase, it is necessary to analyze some soil samples around the site, because the type of soil available on the site may determine the type of the Charco Dam wall to be constructed. Since the type of soil in the project site is Inselberg (massive bare rock outcrop), clayey soil and sandy soil will need to be imported to the Charco Dam site. Since heavy machines such as the front wheel loaders and bulldozers will be required for this work then there will be some off site investment in terms of facilities for storage of fuel to run the equipment to facilitate loading the embankment/dam wall materials.

2.5.4 Water for works

Water will also be required for dam embankment/wall construction works. In case construction works will take place during rainy season, water will be available at the project area as there are useful ponds as shown in the figure below, but if construction will take place during the dry season, the contractor will have either to drill the borehole for underground water or draw water from Duma River, Mata or Simiyu river. Off site investments will be proper intake to ensure that the river banks are not made worse off.

Figure 6: Potentials for construction materials close to the proposed project area

2.5.5 Land

Regarding the land ownership for the proposed project site, the villagers were informed by the village government on the proposal on the Charco Dam project and accepted to release the land which was previously owned by the village government. But there is another small piece of land which was owned by an individual. This person agreed to be compensated and the village government has fully paid him a sum of One Million Tanzania Shillings (1,000,000 Tshs). Thus, the community assured the client that the land has no ownership problem.

3. Policy, Administrative and Legal Frameworks

3.1 Introduction

In Tanzania, the main sources of the environmental legislation are common laws and statutory laws in the form of principal legislation and subsidiary legislation.

Common law refers to binding rules and principles of laws developed by the courts over time as opposed to the laws enacted by Parliament. According to the concepts in environmental law, the common law and rules that are applicable in Tanzania are those developed by the Tanzanian courts, both colonial and post-colonial, as well as those that were in force in England.

Due to the limitations of the common law, Parliaments have also enacted statutory laws to deal with various aspects of environmental protection. All laws enacted by the Parliament in Tanzania are known as principle legislation.

Subsidiary legislation or Environmental Regulations are rules or orders having force of law and are issued by a competent authority under specific provisions of the principle legislation. Regulations vest wide powers, mostly on Ministers of relevant Ministries, to permit, limit, control or prohibit the carrying out of any activities over which they have regulatory competence.

Relevant legislations pertaining to development of Mwamkala Charco Dam project mainly the environmental management in terms of quality, health and safety, pollution of ground and surface water, pollution of soil, land and land use control, forests, wildlife, protection of sensitive areas, protection of endangered species among others, were examined in order to ensure that the proposed development project meets and abides by the existing regulations. In this section, a full analysis of different policies, administrative and legal frameworks and relevant international treaties and conventions as they apply to this project are discussed.

3.2 Environmental Related and Other National Policies

The National Environmental Policy, NEP (1997)

It highlights sustainable development as its core concept. NEP states that Tanzania is committed to sustainable development in the short, medium and long-term. Section 4 of the NEP stresses the importance of Environmental Impact Assessment in the implementation of the Environmental National Action Plan. It asserts that although it is important to tackle immediate environmental problems, precautionary, anticipatory and preventive approaches, used in EIAs, are the most effective and economical measures in achieving environmentally sound development.

The National Land Policy (1996)

It promotes and ensures a secure land tenure system to encourage the optimal use of land resources, and to facilitate broad-based social and economic development without upsetting or endangering the ecological balance of the environment. In recognizing that land has value and can facilitate access to capital, the government has instituted a land policy that supports responsible use, allocation ownership or leasehold, management and land administration. The land policy supports investments in agriculture and other development. It also provides for "full fair and prompt compensations" when land is acquired for development. In the case of this Charco Dam development project, Mwamkala land is by now owned by the village and

there is no people living in the area, compensation was paid some days ago, therefore no anymore compensation to people will be required.

The National Water Policy (2002)

The national water policy (NAWAPO 2002) focuses on participatory planning and cost sharing in the construction, operation and maintenance of community-based domestic water supply schemes and agricultural schemes. It addresses adequately all relevant issues on integrated water resources management and adopts comprehensive policy framework and the treatment of water as both a social and economic good. The police also state clearly how livestock migration and overstocking result in water and land conflicts between pastoralists and other water users and how agricultural activities contribute to pollution from the use of agrochemicals which are washed by rainwater and find their way to water resources. Farmers in collaboration with Busega district council intend to use environmental friendly fertilizers in order to alleviate this pollution.

Underscore disaster management (clause 4.8.3) the policy states that there are disasters associated with dam safety, establishment of dams and reservoirs in a watercourse automatically introduces element of risk in possible loss of life and property to the people living downstream due to possibility of dam failure.
In order to protect against and mitigate the effect of hazards associated with dam safety, Busega District Council and its contractor will have all procedures in place to observe the requirements of the National Water Policy 2002.

The National Irrigation Policy (2010)

The National Irrigation Policy was prepared to provide baseline for a focused development of the irrigation sector in the country. The policy covers interventions required for the sector to effectively contribute towards enhancement of production and productivity in the agriculture sector. The policy recognises that increased global warming and climate change are having negative effects on the optimal availability of water resource for crop production worldwide including Tanzania. The country needs to improve irrigation infrastructure for efficient water utilization to take advantage of the identified irrigation potential area amounting to 29.4 million hectares for sustainable irrigation development. The policy will therefore direct the implementation of irrigation interventions to ensure optimal availability of land and water resources for agricultural production and productivity to contribute effectively towards food security and poverty reduction as stipulated in the National Strategy for Growth and Reduction of Poverty (NSGRP-MKUKUTA).

The National Forest Policy (1998)

The National Forest Policy demarcates and reserves in perpetuity for the benefit of the present and future inhabitants, sufficient forested land and land capable of forestation, to ensure environmental stability and maintenance of the ecological balance including atmosphere equilibrium which is vital for sustenance of all life forms, human, animal and plant. In observance of this requirement Policy Statement No. 23 states that EIA is required for investments which convert forest land to other land use or may cause potential damage to the forest environment.

Without afforestation and other soil erosion control measures, Mwamkala Charco Dam can easily fill up with silt and end up dying at the early stage. Therefore upon completion of project activities, the village will be further sensitized on protecting the existing vegetations and replanting trees.

The Agricultural and Livestock Policy (1997)

The ultimate goal of the Agricultural and Livestock Policy is the improvement of the well being of the people whose principal occupation and way of life is based on agriculture. Most of these people are smallholder and livestock keepers who do not produce surplus. Therefore the focus of this policy is to commercialize agriculture so as to increase income levels. The objectives of the proposed smallholder Irrigation project are in line with this agricultural and livestock policy which is to improve household food security and income among smallholder farmers in respective villages. Therefore while implementing this project a great attention will be paid to the policy requirements and see if they can be achieved through the planned smallholder irrigation project.

The Mineral Policy of Tanzania (1997)

The mineral policy of Tanzania is designed to address the following important aspects

- Raising the contribution of mineral sector in the national economy and increase the gross domestic product (GDP)
- Increase the foreign exchange earnings
- Increase government revenue
- Creation of gainful and secure employment for the rural population and most importantly
- Ensure environmental protection and management.

As far as the environmental protection and management is concerned the policy is aimed at reducing or eliminating the adverse environmental effect of mining, improving health and safety conditions in the mining areas and addressing social issues affecting women, children and the local community. Since the project aims at reducing adverse environmental impacts, LVEMP II initiated preliminary environmental assessment and will work under the policy requirements in extracting the construction materials.

Cultural Policy (1997) covers a wide range of topics relating to both living cultural heritage and historical and archaeological remains ("cultural property"). The policy requires that "all land development shall be preceded by Cultural Resource Impact Studies". No historical or cultural sites observed in the area, however, Busega District Council and the contractor will follow the requirements of this policy and in case such historical or cultural sites are discovered, appropriate measures will be taken to involve local and national authorities in their conservation.

The National Policy on HIV/AIDs (2001)

This is a policy which provides for the framework, direction and general principles in the national response interventions in the prevention, care and support of those infected and affected by the epidemic and mitigation of its impact. The specific objectives of the policy are

- Prevention of transmission of HIV/AIDs
- HIV/AIDs Testing through voluntary testing with pre-and-post test counselling
- Care for people living with HIV/AIDs (PLHAs)
- To strengthen the role of all the sectors, public, private, NGOs, faith groups, PLHAs, CBOs and other specific groups to ensure that all stake holders are actively involved in HIV/AIDS work and to provide a framework for coordination and collaboration
- Research on HIV/AIDs
- To create legal framework by enacting a law on HIV/AIDS with a view to establishing multi-sectoral response to HIV/AIDS and to address legal and ethical

issues in HIV/AIDS and to revise the legal situation of families affected by HIV/AIDS in order to give them access to family property after the death of their parent(s).

- Other objectives include
  - To monitor the efforts towards community mobilization for living positively with HIV/AIDS in order to cope with the impact of the epidemic while safeguarding the rights of those infected or affected directly by HIV/AIDS in the community.
  - To identify human rights abuses in HIV/AIDS and to protect PLHAs and everyone else in society against all forms of discrimination and social injustice.
  - To provide appropriate effective treatment for opportunistic infections at all levels of the health care system
  - To work closely with the Ministry of Home Affairs, NGOs and Faith Groups in the fight against drug substance abuse that increases the risk of HIV transmission
  - To prohibit misleading advertisements of drugs and other products for HIV/AIDS prevention, treatment and care.

In order to contribute towards observing the objectives of the National Policy on HIV/AIDs, the project proponent will have HIV/AIDs programme aimed at promoting awareness of HIV/AIDs among its service providers and its employees.

The National Employment Policy (1997)

The policy aims at

- Preparing the conducive environment for the unemployed to employ themselves by directing more resources to the self employment sectors,
- Identifying potential areas for employment and to lay down strategies of how to utilize such areas in promoting employment in the country,
- To prepare a special procedure for coordination and developing sources of employment including creation of a body that will supervise implementation of the employment policy,
- Identify and elaborate on the status and roles of various stakeholders in promoting and sustaining employment.
- To strengthen (through removal of bottlenecks the relationship between formal sector and that of self employment.
- To develop the self employment sector in rural areas so as to reduce the rate of migration to urban areas.
- To ensure that activities initiated on self employment Act as a basis for development of the economy and are an inspiration for the culture of self reliance, etc

In view of the Government efforts in development of National Employment Policy, the contractor in collaboration with Busega District Council intends to supplement these efforts by providing some few employments during the project implementation. During this period, transfer of technology can be attained among those who will be employed and after their contract terms they can engage in self employment activities in the informal sector with abundant wealth which has not been exploited significantly. A few will be engaged by respective villages in attending the project during operation phase.

Women and Gender Development Policy (2000)

The Women and Gender Development policy's overall objective is to promote gender equality and equal participation of men and women in economic, cultural and political matters. Also focuses on - fairer opportunities for women and men and access to education, child care, employment and decision making. Therefore during project implementation the proponent intends to give fair opportunities for both women and men.

National Construction Industry Policy (2003)

The main objectives of the Construction Industry Policy include:

- To improve the capacity and competitiveness of the local construction enterprises (contractors, consultants and informal sector)
- To develop an efficient and self-sustaining roads network that is capable of meeting the diverse needs for construction upgrading and maintenance of civil works for trunk, regional, districts and feeder roads network.
- To improve the capacity and performance of the public sector and private sector clients so as to ensure efficient, transparent and effective implementation and management of construction projects.
- To ensure efficient and cost effective performance of the construction industry that will guarantee value for money on constructed facilities in line with best practices.
- To promote application of cost effective and innovative technologies and practices to support socio-economic development activities such as road works, water supply, sanitation, shelter delivery and income generating activities.
- To ensure application of practices, technologies and products which are not harmful to both environment and human health
- To mobilize adequate resources from both the public sector and the private sector for construction and maintenance of public infrastructure.
- To enhance participation in regional and international co-operation arrangements for the purpose of promoting the capacity and competitiveness of the industry and developing markets for export of its services and products.
- To improve co-ordination, collaboration and performance of the institutions supporting the development and performance of the construction industry.
  With respect to environmental protection and conservation, section 8.2.2 of the National Construction Industry Policy addresses a number of issues regarding the environment. The construction industry is generally said to be a major source of environmental damage and occupational health problems. A number of the industry's activities are environmentally not sustainable partly owing to lack of awareness of environmentally sound practices and technologies.

Moreover, construction activities affect the environment in many ways: through resource deterioration, physical disruption and chemical pollution. Large civil engineering projects can easily destabilize fragile hill slopes. As a step towards observing the requirements of this policy, the proponent has facilitated carrying out of the Environmental Impact Assessment to safeguard the environment and intends to use the services of a local registered contractor aware of the environmental issues.

National Fisheries Sector Policy and Strategy Statement

The Fisheries Sector Policy and Strategy Statement states that: to protect the productivity of biological biodiversity of aquatic ecosystems through prevention of habitat destruction, pollution and over exploitation: develop environmental impact assessment (EIA guidelines to ensure that EIA is carried out and taken into consideration in all fisheries sector project.

Since the project may involve raising fish in the charco dam, all requirements of this policy will be observed.

KILIMO KWANZA (Agriculture First) is a national resolve to accelerate agricultural transformation. It comprises of a holistic set of policy instruments and strategic interventions towards addressing the various sectoral challenges and takes advantage of the numerous opportunities to **modernize** and **commercialize** agriculture in Tanzania.
One of the ten pillars of Kilimo Kwanza is infrastructure development and in this case irrigation infrastructures. Charco dam construction for irrigation is aimed at supporting these initiatives. Also the efforts of the government to achieve Kilimo Kwanza through the Ministry of Agriculture and Food Security and Cooperatives, where by a number of strategic interventions such as construction and rehabilitation of the irrigation infrastructure are being implemented. Therefore this project is indeed aimed at these Kilimo Kwanza initiatives and will work towards observing all the requirements and guidance of Kilimo Kwanza.

3.3 Laws, Regulations and Guidelines

3.3.1 Acts Dealing with Environment or relate to EIA

The Environmental Management Act (EMA), Cap 191 (No. 20 of 2004)
The administrative and institutional arrangements for environmental management for all sectors in Tanzania are stipulated in the Environmental Management Act, Cap 191 (No. 20 of 2004). EMA Cap 191 gives National Environment Management Council (NEMC) the overall responsibility for undertaking the enforcement, compliance, review and monitoring of Environmental Impact Assessment and in this regard facilitates public participation in environmental decision-making. NEMC is responsible for screening and reviewing various investments and projects of the national significance.

Environmental Impact Assessment and Audit Regulation of 2005
These regulations were prepared under EMA Cap. 191 and require developers to conduct an Environmental Impact Assessment for any project likely to have negative impacts on the environment. Application for an Environmental Impact Assessment certificate is necessary for such project.

3.3.2 Acts Dealing with Land Use Planning

Land Act Cap 113, (No. 4 of 1999)
The Land Act, Cap 113, replaces the previous basic land law of 1923, and establishes three categories of land: general, village and reserved. In addition, land may be declared 'hazard land' where its development might lead to environmental damage, e.g. locations such as wetlands, mangrove swamps and coral reefs, steep lands and other areas of environmental significance or fragility. The Act recognizes customary tenure as of equal status to granted rights of occupancy. Importantly the Land Act promotes gender equality by recognizing equal access to land ownership and use by all citizens- men and women – and giving them equal representation on the land committees. Under this project the proposed scheme development activities are to be carried out in the village land which is owned by village government through existing country legislations. Therefore, the village took initiatives of securing land for the scheme through agreements reached within the village.

The Land (Forms) Regulation 2001

The Land Regulations were made under section 179 of the Land Act 1999, and provide all specific forms required for Management and Administration, Granted Right of Occupancy, Mortgage, Lease, Easement, Co-occupancy and others including compensation forms (Forms 69 and 70). Land acquisition was done by the village government hence no any kind of compensation will be required.

The Village Land Act, Cap 114 (No. 5 of 1999)

The Village Land Act, Cap 114 (No.5 of 1999) confers the management and administration of village lands to Village Councils, under the approval of the Village Assemblies, although the Minister of Lands is entitled to decide on the size of land which can be owned by a single person or commercial entity. The acts also provides for the fundamental principles of National Land Policy which are the objectives of the Village Land Act, Cap 114 geared towards;

- ensuring that existing rights and recognized long standing occupation or use of land are clarified and secured by the law;
- ensuring that land is used productively and that any such use complies with the principles of sustainable development;
- to take into account that an interest in land has value and that value is taken into consideration in any transaction affecting that interest; and

to pay full, fair and prompt compensation to any person whose right of occupancy or recognized long-standing occupation or customary use of land is revoked or otherwise interfered with to their detriment by the State under this Act or is acquired under the Land Acquisition Act, Cap 118 of 2002. In view of these requirements, Busega district council allowed the village to secure land without encumbrances ready for public use in development of the Charco Dam.

The Land Acquisition Act, Cap 118 of 2002

The Land Acquisition Act of 2002 requires the minister responsible for land to pay compensation as may be agreed upon or determined in accordance with the provisions of the Act. The Act stipulates that no compensation shall be awarded in respect of land, which is vacant ground, or to be limited to the value of the un-exhausted improvement of the land, in case the development of the land is deemed in adequate.

The Act defines the circumstances in which public interest could be invoked, e.g., for exclusive government use, public use, for or in connection with sanitary improvement of any kind or in connection with laying out any new city, municipality, township or minor settlement or extension or improvement of any existing city. Other purposes are in connection with development of any airfield, port or harbour; mining for minerals or oils; for use by the community or corporation within community; for use by any person or group of persons as the President may decide to grant them such land. The acquisition of the land for the public use as well as for the resettlement sites is within the provision of this Act. Further the Act specifies other requirements prior to the acquisition of the land such as investigation for the land to be taken, issuing notice of intention to take land and mode in which notices will be served. It further defines the requirements for and restrictions on compensation.

The Busega district council has observed this requirement through allowing the villagers to secure land on their own.

Land Use Planning Act No. 6 of 2007

This Act repeals the National Land Use Planning Commission Act No.3 of 1948 that established a National Land Use Commission (NLUC) as the principal advisory organ of the

government on all matters related to land use. Among other things, it recommends measures to ensure that the government policies, including those for development and conservation of land, take adequate account of their effects on land use, seek the advancement of scientific knowledge of changes in land use and encourage development of technology to prevent, or minimize adverse effects that endanger human's health and welfare. The Act also specifies standards, norms and criteria for the protection of beneficial uses and the maintenance of the quality of the land.

The Land Use Planning Commission, currently, does not have any bearing on the Charco Dam development activities proposed by Busega District as the proposed site is located in open space where other land use development activities cannot be interfered with.

3.3.3 Acts Dealing with Natural Resources

Forest Act No. 14 of 2002

This Act deals with the protection of forests and forest products in forest reserves and the restrictions and prohibitions in forest reserves. Forest Management plans are administered under the Forest ordinance (1957). Any contravention of the restrictions and prohibition is considered an offence under this ordinance and subject to enforcement. The law was revised in 2002 to meet the new requirements under the Forest Policy. The new Forest Act No. 14 of 2002 requires that for any development including mining development, construction of dams, power stations, electrical or telecommunication and construction of building within a Forest Reserve, Private Forest or Sensitive Forest, the proponent must prepare an Environmental Impact Assessment for submission to the Director of Forestry. The law also requires licenses or permits for certain activities undertaken within the national or local forest reserves, such as, among others, felling or removing trees, harvesting forest produce, entering a forest reserve for the purpose of tourism or camping, mining activities, occupation or residence within the reserve, cultivation, erecting any structures. The proposed project does not touch any of the forest reserves, however the requirement of this Act will be observed for sustainability of the project.

Wildlife Conservation Act, No. 5 of 2009

The Wildlife conservation Act establishes protected areas with restriction on access and utilization of wildlife resources. Among these protected areas include Game Reserve, Wetlands, Wildlife corridor, Dispersal areas and species management areas. The Act state clearly restrictions applying to game reserves, wetlands and game controlled area that any person shall not dig, lay, or construct any pitfall, net trap, snare or use any other device capable of killing, capturing or wounding any animal and conduct crop cultivation within any game reserve, wetlands reserve or game controlled area. The proposed project area is purely used for agricultural activities; therefore the legislation has no significant bearing to the project activities.

The Mining Act No. 14 of 2010

This Act provides for prospecting of minerals, mining and dealing in minerals. It also provides for building materials including all forms of rock, stones, gravel, sand, clay, volcanic ash or cinder or other minerals being used for the construction of buildings, roads, dams, and aerodromes or similar works. The Legislation makes EIA mandatory as a precondition for granting various categories of mining licenses. In this project borrow material and all forms of rock stones, gravel, clay and sand will be mined from existing borrow area or new ones developed where by all the requirements of the Act will be met in parallel to other development projects in Busega District all in agreement to respective authorities and owners.

The Water Resources Management Act No. 11 of 2009
Water legislation has been updated to bring it in line with the National Water Policy 2002. This current Water Resources Management Act No. 11 of 2009 provides for institutional and legal framework for sustainable management and development of water resources; outlines principles for water resources management; provides for the preventions and control of water pollution; provides for participation of stakeholders and the general public in implementation of the National Water Policy; repeals the Water Utilization (Control and Regulation) Act, 1974 and vests all water in the country to the Government of United Republic of Tanzania and sets procedures and regulations for the extraction of water resources, but does not provide for the wetland resource management.

The Act also states clearly the registration of dams with safety risk, factors to be considered in declaring dams with safety risk and review of dam facilities where the owner of the dam with or without safety risk shall carry out the comprehensive facility review after five years and where an earthquake or land slide has occurred proximate o a dam. After carrying out a comprehensive facility review the owner of the dam shall submit a report to the director where the director shall review the report and issue directives to owner of the dam on remedial measures to be taken to remedy any risk. Busega District Council in collaboration with the Mwamkala villagers intends to consider all requirements of this act.

Water Supply and Sanitation Act No. 12 of 2009
The Water Supply and Sanitation Act No. 12 of 2009 has been enacted to provide for sustainable management and adequate operation and transparent regulation of water supply and sanitation services with a view to give effect to the National Water Policy (2002). It further provides for the establishment of water supply and sanitation authorities as well as community owned water supply organizations.

Fisheries Act No. 22 of 2003
This is an Act which repeals and replaces the Fisheries Act 1970 and makes provision for sustainable development, regulation and control of fish, fish products, aquatic flora and its products and other rated matters.
Clause 15 of the Act states the local authorities shall monitor the performance of aquaculture practices within their areas of jurisdiction. Also Clause 52 of the Act states that no person shall undertake any development activities in this Act without undertaking EIA in accordance with any written laws of Tanzania. Since the project will involve breeding or raising fish in the charco dam, all requirements of this Act will be observed.

3.3.4 Acts Dealing with Trades and Professional Ethics / Conduct

The Engineers Registration Act No. 15 of 1997, R.E. 2002
This is an Act which formed the Engineers Registration Board, a statutory body with the responsibility of monitoring and regulating engineering activities and the conduct of engineers and engineering consulting firms in Tanzania through registration of engineers and engineering consulting firms. Under the law, it is illegal for an engineer or an engineering firm to practice Engineering profession if not registered with the board. The board has also been given legal powers and has the obligation to withdraw the right to practice from registered engineers if found guilty of professional misconduct or professional incompetence. Registration with the board is, thus, a license to practice engineering in Tanzania.

Charco Dam construction project is an engineering assignment and the project proponent is observing all the requirement of this Act through engaging the services of personnel and firms that are registered with the Engineers Registration Board.

The Contractors Registration Act No. 17 of 1997 R.E. 2002

This is an Act which provides for registration of contractors and also establishment of the Contractors Registration Board, the body responsible for regulating the conduct of contractors in Tanzania. The project proponent will equally abide by all requirements of this Act in terms of supporting the activities of the board during inspection of any site for access road patching, installation, erection or demobilizing works for the purpose of verifying and ensuring that the works are being undertaken by registered contractors; and that the works comply with all governing regulations and laws of the country.

The Occupational Health and Safety Act No. 5 of 2003

This Act sets provisions for the safety, health and welfare of persons at work in factories and other places of work. It is also meant to provide for the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with activities of persons at work; and to provide for connected matters. The Charco Dam construction project will eventually be a place of work to be registered as per OSHA regulations that govern the places of work and observe all safety and health practices at work sites by its consultants, contractors and sub-contractors.

The Surface and Marine Transport Regulatory Authority Act No. 9 of 2001

This is an Act which established the Surface and Marine Transport Regulatory Authority (SUMATRA) mainly dealing with surface and marine transport sectors. The Act presents a "regulated sector" environment in which SUMATRA executes its duties. This regulated sector includes rail transport, ports and maritime transport, public passenger road transport and commercial road transport:

The Act gives the duties of SUMATRA to include

(a) Perform, the functions conferred on the Authority by sector legislation;

(b) subject to sector legislation:

- (i) to issue, renew and cancel licenses;
- (ii) to establish standards for regulated goods and regulated services;
- (iii) to establish standards for the terms and conditions of supply of the regulated goods and sources;
- (iv) to regulate rates and charges;
- (v) to make rules.

(c) To monitor the performance of the regulated sectors, including, in relation to-

- (i) levels of investment;
- (ii) availability, quality and standards of services;
- (iii) the cost of services;
- (iv) the efficiency of production and distribution of services, and
- (v) other matters relevant to the Authority;

Since all these elements are core to the success of the proposed Charco Dam construction project, any transportation elements of construction equipment will follow the set requirements.

The Roads Act No. 13 of 2007

This Roads Act provides for road financing, development, maintenance, management and other related matters. Since Busega District Council and the respective villages intend to construct the access roads to the dam, then the important clauses of the Roads Act will be observed in totality. The Act also provides for offences, penalties and recovery on destroying bridges, causing damage to public roads, obstructions on roads, nuisance on roads, stretching of ropes over public roads etc. The fines are also prescribed under the offences committed on the public roads. Busega District Council will observe all the requirements of this Act in order to have smooth execution of its Charco Dam development activities.

3.3.5 Acts with a Bearing on Environment at the District Level

Local Government (District) Authorities Act No. 7 of 1982

The Act provides for; inter alia, the establishment, composition, functions and legislative powers of district, township councils and village authorities. At the village level, the government structure is comprised of a village assembly consisting of all persons aged 18 and above. There are also village committees covering such matters as planning, finance, economic affairs, social services, security, forest protection, water resources etc [Section 35].

The village council's functions and roles include planning and coordinating activities, rendering assistance and advice to the villagers engaged in agriculture, forestry, horticultural, industrial or any other activity, and to encourage village residents to undertake and participate in communal enterprises. As an administrative subdivision between the village and the district, the ward reviews the proposed village council's projects in its jurisdiction and approves them for passage up the line to the District Development Committee.

Local Government (District) Authorities Act of 1982 as amended by Act No. 6 of 1999 establishes the Ward Development Council (hereinafter referred to as "WDC). The WDC is responsible for developing general development plans for the ward. Further, the WDC must manage disasters and environmental related activities within its ward.

Local Government (District) Authorities Act, No. 7 of 1982 also provides for the protection and management of the environment on the part of the district council. This is deduced from section 111 of the Act, which promotes social welfare and economic well being of all residents within its area of jurisdiction.

Protection and management of the environment is further provided for under section 118 of Act number 7 of 1982. District councils are required to take the necessary measures to control soil erosion and desertification; to regulate the use of poisonous and noxious plants, drugs or poison; regulate and control the number of livestock; maintain forests; manage wildlife; ensure public health; provide effective solid and liquid waste management protect open spaces and parks etc. The Act also has provisions for a scheduled timetable and management of the environment. Since the project will be touching the areas where the local government authorities have roles to play, the village will work hand in hand with Busega District Council and other local government structures for the success of the project.

3.3.6 Other Relevant International Treaties and Conventions

Tanzania has ratified a number of Multilateral Environmental Agreements (MEAs) and consequently has duties under those agreements. In this Charco Dam project, work will be carried out in environments likely to be affected if mitigation measures are not strictly applied.

Table 2: Multilateral Environmental Agreements (MEAs), Treaties and Conventions to which Tanzania is a party

Type of Convention	Name of Convention	Relevance to the Project
2. Bio diversity related Conventions	1. Convention of Biological Diversity, (1992) ratified by Tanzania in 1996).	Project activities involve clearing of vegetation. The Busega District council will work with the respective communities in conservation of available plant and animal species.
	2. Convention to combat, desertification, particular Africa, Paris 1994	
	3. The Cartagena Protocol on Bio safety to the convention on Biological Diversity (2000)	
Other Conventions	1. The convention on International Trade and Endangered species of Wild Fauna and Flora (CITES), Washington (1973)	The project operations are likely to encounter area with endangered flora and fauna species, though no such species were observed during the study. The project staff, villagers and the Contractors staff will in no event involve themselves with trade of these species
	2. The convention concerning the Protection of World Cultural and Natural Heritage, Paris, (1972)	
	3. The convention of Wetlands of International Importance especially as water fowl Habitat (The Ramsar Convention) (1971) ratified by Tanzania in 1998).	
Climatic change Conventions	1. The United Nations Framework convention on climatic change (1992)	The project will prevent further clearance of vegetation in order to improve and maintain Carbon dioxide consumption
	2. Kyoto Protocol (1997)	
Regional conventions	1. The Convention on the conservation of Nature and Natural Resources, 1968 Algiers, (1968)	
	2. The Bamako convention on the Ban of the import into Africa and the control of Trans boundary movement of Hazardous Wastes within Africa, 1990	All importations of chemicals e.g. for fumigation/spray (if any) are following national legislations on the Industrial and consumer chemicals (Management and Control Act No. 3 of 2003
	3. Nairobi Convention for the protection, management and development of the Marine and Coastal environment of Eastern African Region, 1985 and the related protocols.	
	4. Lusaka Agreement on cooperative enforcement operations Directed at illegal Trade in Wild Fauna and Flora (1994)	The project operations are likely to encounter area with endangered flora and fauna species. The project staff, villagers and the Contractors staff will in no event involve themselves with trade of these species

3.4 The World Bank's Safeguard Policies

The World Bank has keen interest in protection of the environment, particularly for investment projects supported by the Bank; they have to be in line with its safeguards policies. These policies provide guidelines, aimed at preventing and mitigating undue harm to people and the environment, when implementing development projects. The safeguard policies provide a platform for the participation of stakeholders in project design and implementation and the relevant policies to this project are:

- Environmental Assessment (OP/BP 4.01)
- Natural Habitats (OP/BP 4.04)
- Forests (OP/BP 4.36)
- Involuntary Resettlement (OP/BP 4.12)
- Indigenous Peoples (OP/BP 4.10)
- Pest Management (OP 4.09)
- Physical Cultural Resources (OP/BP 4.11)

The construction of the Charco Dam project triggers some of these operational policies of the World Bank as presented below;

3.4.1 OP/BP 4.01 Environmental Assessment Policy

The objective of this policy is to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental impacts. This policy is triggered if a project is likely to have potential (adverse) environmental risks and impacts on its area of influence. OP 4.01 covers impacts on the natural environment (air, water and land); human health and safety; physical cultural resources; and trans-boundary and global environment concerns.

Depending on the project, and nature of impacts a range of instruments can be used: EIA, environmental audit, hazard or risk assessment and environmental management plan (EMP). When a project is likely to have sectoral or regional impacts, sectoral or regional EIA is required. The Borrower is responsible for carrying out the EIA.

Under this project, the proponent Ministry of Water (LVEMP II) has facilitated the undertaking of Environmental and Social Impact Assessment to assess the social and environmental impacts of the project.

3.4.2 OP/BP 4.12 Involuntary Resettlement

The policy acknowledges that development projects that displace people generally give rise to economic, social and environmental problems. Its objective therefore, is to avoid or minimize involuntary resettlement where feasible, by exploring all viable alternative project designs. OP 4.12 is intended to assist displaced persons in maintaining or improving their living standards. It encourages community participation in planning and implementing resettlement; and in providing assistance to affected people, regardless of the legality of title to the land they posses, which has to be acquired for project activities. The Bank guidelines therefore, prescribe measures to minimize the negative impacts to ensure that the displaced community benefits from the project and to ensure that the affected persons are:

- compensated for their losses at full replacement costs prior to the actual move;
- assisted with the move and supported during the transition period in the resettlement site;
- assisted in their effort to improve (or at least restore) their former living standards, income earning capacity and production levels;

- integrated socially and economically in the host communities, so that adverse impacts in the host communities are minimized. This is best achieved through appropriate planning and consultation, involving affected people.

In addition; land, housing, infrastructure and other compensation should be provided to the adversely affected population, indigenous groups, ethnic minorities, and pastoral people who may have customary rights to the land and other resources taken for the project. The absence of legal title to land by such groups should not be a bar to compensation.

The policy is triggered not only if physical relocation occurs, but also by any loss of land resulting in relocation or loss of shelter; loss of assets or access to assets; loss of income sources or means of livelihood, whether or not the affected people must move to another location.

The existing policies, land laws and regulations regarding land acquisition and compensation in the country should be generally consistent with the World Bank Operational Guidelines. Therefore, if necessary at all, compensation could still be handled within the existing regulations, without contradicting the World Bank Policy requirements. Even though this respective policy is triggered but fortunately the Charco Dam project was identified by the respective villages having realised the impacts exerted on surrounding environment and later Lake Victoria. Also since the effected people are the residents of the Mwamkala village who are equally going to benefit from the proposed project.

3.4.3 OP/BP 4.04 Natural Habitats

This policy recognizes that the conservation of natural habitats is essential to safeguard their unique biodiversity and to maintain environmental services and products for human society and for long-term sustainable development. The Bank therefore supports the protection, management, and restoration of natural habitats in its project financing, as well as policy dialogue and economic and sector work. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. Natural habitats are land and water areas where most of the original native plant and animal species are still present. Natural habitats comprise many types of terrestrial, freshwater, coastal, and marine ecosystems. They include areas lightly modified by human activities, but retaining their ecological functions and most native species.

This policy is triggered by any project (including any sub-project under a sector investment or financial intermediary) with the potential to cause significant conversion (loss) or degradation of natural habitats, whether directly (through construction) or indirectly (through human activities induced by the project).

The policy is slightly triggered as it is going to inundate some of the natural habitat which might be supporting other ecosystems. Environmental Impact Assessment has identified these natural habitats and mitigation measures are presented.

3.4.4 OP/BP 4.36 Forests

The objective of this policy is to assist borrowers to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development and protect the vital local and global environmental services and values of forests. Where forest restoration and plantation development are necessary to meet these objectives, the Bank assists borrowers with forest restoration activities that maintain or enhance biodiversity and ecosystem functionality. The Bank assists borrowers with the establishment of environmentally appropriate, socially beneficial and economically viable forest plantations to help meet growing demands for forest goods and services.

This policy is triggered whenever any Bank-financed investment project (i) has the potential to have impacts on the health and quality of forests or the rights and welfare of people and their level of dependence upon or interaction with forests; or (ii) aims to bring about changes in the management, protection or utilization of natural forests or plantations.

The policy is slightly triggered as some of the areas where forests would have developed are the ones that will be inundated by the flood water of the proposed Charco Dam.

3.4.5 OP 4.09 Pest Management

The objective of this policy is to (i) promote the use of biological or environmental control and reduce reliance on synthetic chemical pesticides; and (ii) strengthen the capacity of the country's regulatory framework and institutions to promote and support safe, effective and environmentally sound pest management. More specifically, the policy aims to (a) Ascertain that pest management activities in Bank-financed operations are based on integrated approaches and seek to reduce reliance on synthetic chemical pesticides (Integrated Pest Management (IPM) in agricultural projects and Integrated Vector Management (IVM) in public health projects. (b) Ensure that health and environmental hazards associated with pest management, especially the use of pesticides are minimized and can be properly managed by the user. (c) As necessary, support policy reform and institutional capacity development to (i) enhance implementation of IPM-based pest management and (ii) regulate and monitor the distribution and use of pesticides.

The policy is triggered if : (i) procurement of pesticides or pesticide application equipment is envisaged (either directly through the project, or indirectly through on-lending, co-financing, or government counterpart funding); (ii) the project may affect pest management in a way that harm could be done, even though the project is not envisaged to procure pesticides. This includes projects that may (i) lead to substantially increased pesticide use and subsequent increase in health and environmental risk; (ii) maintain or expand present pest management practices that are unsustainable, not based on an IPM approach, and/or pose significant health or environmental risks.
Under the construction of the Charco Dam project, the policy will not be triggered as the project will not involve any pesticides. During irrigation on horticultural activities, local communities will trained on proper pest management.

3.4.6 OP/BP 4.11 Physical Cultural Resources

The objective of this policy is to assist countries to avoid or mitigate adverse impacts of development projects on physical cultural resources. For purposes of this policy, "physical cultural resources" are defined as movable or immovable objects, sites, structures, groups of structures, natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above ground, underground, or underwater. The cultural interest may be at the local, provincial or national level, or within the international community.

This policy applies to all projects requiring a Category A or B Environmental Assessment under OP 4.01, project located in, or in the vicinity of, recognized cultural heritage sites, and projects designed to support the management or conservation of physical cultural resources.
The policy may be triggered during excavation of fill materials at both existing and new borrow sites however it is not expected that physical cultural resources will be affected.

3.4.7 OP/BP 4.10 Indigenous Peoples

The objective of this policy is to (i) ensure that the development process fosters full respect for the dignity, human rights, and cultural uniqueness of indigenous peoples; (ii) ensure that adverse effects during the development process are avoided, or if not feasible, ensure that these are minimized, mitigated or compensated; and (iii) ensure that indigenous peoples receive culturally appropriate and gender and inter-gene rationally inclusive social and economic benefits.

The policy is not triggered as it is not expected that indigenous peoples will be affected by the proposed Charco Dam project and above all the project was initiated by the respective local community.

3.5 Administrative Framework

3.5.1 Central Government Agencies

Environment Matters at the National Level

At the national level, the institutional and legal framework for sustainable management and development of Charco Dam project falls under the Ministry of Water. The ministry issues policy guidance and provides legal frameworks, water licenses, certificate of compliance and project monitoring.

Under the legal framework, the Water Resources Management Act No. 11 of 2009, assigns the following mandates;

- The Minister is responsible for management of water resources through national policy and strategy formulation and ensuring the execution of the functions connected with the implementation of the Water Resources Act No 11 of 2009
- The Minister is assisted in the discharge of his duties by the Director of Water Resources.

The overall structure of Water Resources Management includes:

1. Minister of Water
2. Director of Water Resources
3. National Water Board
4. Basin Water Boards
5. Catchment and Sub-catchment Water Committees

When it comes to fulfilment of connected legal frameworks, the Act states that. "Any proposed development in a water resource area or watershed to which the Act applies, whether that development is proposed by or is to be implemented by a person or organization in the public or private sector shall carry out an Environmental Impact Assessment in accordance with the provisions of the Environmental Management Act cap 191". In this respect, then comes the Vice Presidents office with the following institutions;

- Division of Environment who coordinate environmental management activities like coordination of environmental policy and issuing environmental clearance or EIA approvals.
- National Environment Management Council (NEMC) - coordinating the Environmental Impact Assessments, Monitoring and Auditing.

Administrative Framework

The Minister responsible for Environment (VP Office) is the overall responsible for all matters relating to environment, responsible for all policy matters, necessary for the promotion, protection, and sustainable management of Environment in Tanzania.

The Director of Environment coordinates various environmental management activities being undertaken by other agencies and promotes the integration of environment consideration into policies, plans and programmes, strategies and projects.

EMA Cap 191 gives NEMC the overall responsibility of undertaking enforcement, compliance, review and monitoring of Environmental Impact Assessment.

Specifically, the project is under the Ministry of Water and is managed by LVEMP II from all initial stages up to when it is handed over to the community for operation. The project will be community based throughout its life and therefore the local community will have to run it. The villagers will form the Water User Committee which will make all management issues pertaining to the project and solve social conflicts related to water usage in the Charco Dam. But if the conflict becomes complex then they will be reporting to the Busega district Authority for more clarification.

3.5.2 Regional and District Administrative Structures

Environment at Regional and District Levels

The Regional Administration Act No. 9 of 1997 provides for Regional Commissioners to oversee Regional Secretariats, with District Commissioners directly supervising the District Councils. Local authorities oversee the local planning processes, including establishing local environmental policies.

The National Environmental Policy establishes a policy committee on Environment at Regional level chaired by the Regional Commissioner, mirrored by environmental committee at all lower levels, i.e. at the District, Division, Ward and Village or "Mtaa" Councils.

Under EMA Cap 191, the Regional Secretariat is responsible for coordination for all advice on environmental management in their respective region and in liaison with the Director of Environment. At Local Government level, an Environmental Management Officer should be designated or appointed by each City, Municipal, District or Town Council. In each City or Municipality or District, Environmental Committees should be established to promote and enhance sustainable management of the Environment. The Ward Development Committee is responsible for proper management of the environment in their respective areas. The District or Municipal Council designates for each administrative area as township, ward, village, '*mtaa', 'kitongoji'* and Environmental Management Officer coordinates all functions and activities related to protection of environmental in their areas. In all levels starting at the regional level towards village level- (i.e. Simiyu Region, Busega District, Nyaluhande ward, Mwamkala village and to the lower level, such environmental structures are developed and the Consultants consulted and worked with the Ward Development Committee and the Village Council at the ward and village levels respectively.

4. Baseline Conditions

NB:
As discussed previously, before decentralization of some districts and regions in the country, Mwamkala Village was in Magu administration district boundary in Mwanza region, after decentralization, Mwamkala village is located in a newly developed district (Busega district) in a newly developed region, Simiyu. Based on this fact, Busega district has not yet developed the stand alone socio-economic profile. Therefore, some information from the socio-economic profile for Magu district council is presented in this chapter in order that the readers may have a little understanding of the project area.

4.1 Physical Environment

4.1.1 Climatic conditions

Busega district experiences the minimum and maximum temperatures of 18^0C to 20^0C during the rainy season, and 26 ^{0}C to 30^0C during the dry season. The annual rainfall is bi-modal with the short rains in October to December. January and February are dry periods. The heavy rains occur in March to May. Annual rainfall ranges from 700mm to 1,000 mm.

4.1.2 Soils

The project area is characterized by with black cotton soil. A large portion of the district soil is granite inselberg (a massive bare rock outcrop common in the tropics) with a progression of yellow-red hill sands to the poorly drained dark grey loam sands and clays (in valleys and low – plains).

4.1.3 Settlement Patterns

The situation of housing in the study area exhibits typical rural infrastructure. About 62 percent of houses in the villages are semi permanent constructed by poles and mud bricks, thatched with grass; 31 percent of houses are permanent with mud bricks and roofed by galvanized sheets while the remained 7 percent comprises of houses made of cement bricks, with cement floor, plaster and roofed with iron sheets. Most of these houses are public institutions.
Settlement pattern is a critical issue as far as the dam project is concerned that all structures are constructed in the upper land while the dam is located in low land/downstream and regarding poor construction of latrines and habit of many people using outdoors to relieve themselves pose a threat to the dam. The rampant of human faeces and animal manure (dung) will definitely contaminate water in the dam. Serious measures should be taken to prevent children and adults from swimming in the dam to avoid communicable diseases such as bilharzias, typhoid and intestinal worms.

4.2 Socio-Cultural Environment

4.2.1 Population

Mwamkala village is in Nyaluhande ward, Busega district in Simiyu region. It has a total population of 3,941 of which 1,926 are men and 2,015 are women with a total number of 567 households. The village has 1,090 (434 Male and 656 Female) people who are capable of engaging in development works.

4.2.2 Existing Land Use

The proposed project area is used for grazing and cultivation. Generally the area around the project is used for agricultural purposes. The neighbouring land is occupied by individual farms such as for sweet potatoes, millet, maize, cotton, rice and groundnuts. The project land ownership like this: about 90% of the land was owned by the village government (village land) and it has been provided for free in order to construct the charco dam for the benefit of the village. The other piece, about 10% of the total project land was owned by an individual who agreed to be paid one million (1,000,000 Tshs) as compensation, and he is already paid by the village council. The total land area required for the project is about 3 hectares. Thus, there is no land ownership conflict at the proposed project site as the project originated from the village itself not imposed from outside.

Magu district in general has an area of 4800 km^2 of which 3075 km^2 is a dry land and 1725 $km^{2,}$ is covered with water, mainly Lake Victoria, which extends from west to North – East. Grazing area is 1509 km^2 agricultural land 1359 km^2. The remaining area (207 km^2) is for residential settlement and natural resources.

4.2.3 Water Supply

Mwamkala village communities have no community piped water supply; they depend on underground water resources and surface water (tributaries). The village has 5 tributaries and fifteen (15) shallow wells of which only eighty (8) are working.

4.2.4 Economic Activities

The villagers of Mwamkala deal with agricultural activities. Mwamkala village has 4,132 cattle, 3,792 goats and 1,015 sheep. The main activities in the village are livestock keeping and cultivation. The main crops grown in the village are cotton, sorghum, maize, cassava, paddy and cow peas. The village has a total of 7,972 ha potential area for agriculture; 1,265 ha for settlement; 60 ha forests and mountains; and 12 ha planted trees. The income of the village per annum is Tshs 115,200,000, which gives Tshs 29,231 as per capita income.
The major food crops grown in the project area are maize, cotton, round and sweet potatoes, groundnuts and sesame. Cattle, sheep and goats are traditionally kept in most parts of the project and nearby villages.
In general, Magu district depends mainly on cultivation and livestock keeping as economic bases. Other economic activities conducted in the district are fishing and small scale trade.

DGDP and Per Capita Income
Magu district sectoral contribution to DGDP are Agriculture and livestock contribute 85%, Fishing contributes 10%, and employs 3% of the total population and Industries (medium and small scale) employ 5% and contribute 3% to DGDP. The services sector employs 2% of the population, with a contribution to DGDP of 2%.

Table 3: DGDP and per capita income (PCI)

Year	DGDP[Tshs]	Per Capita Income[Tshs]
1998	22,633,000,000	50,000
1999	18,800,859,000	43,300
2000	18,577,371,000	43,500
2001	23,488,630,000	55,000
Average	20,874,965,000	48,450
National goal		192,000

Source: Magu district Socio-economic profile, 2011

However, there is no regular flow in both DGDP and PCI. The fluctuations are mainly due to:-Unreliable weather/rainfall and lack of irrigation Programmes, Lack of a substitute cash crop (dependence on cotton only) and Fluctuations in market prices for cash crops as well as other goods like Fish and alike.

Productive Sectors

i. Agriculture:

Although this sector forms the district's economic base, it is still conducted in the old/traditional method where peasants use obsolete technology (hand tools – hoes) and fertilizers are applied at low level. Irrigation is used in horticulture cultivation along the lake shores and rivers.

Area suitable for agriculture (arable land) is 236,300 hectares, and the average area cultivated per annum is 160,000 hectares (67.7% of the arable land).

Food crops grown are Maize with an average yield of 0.8; Rice, 14,724 ha with average yield 2.4; Millet 1,573 ha with average yield 2.0; Sorghum, 19,000 ha; Cassava, 20,000 ha with average yield 1.6; Sweet potatoes, 18,000 ha with average yield 1.5 and Legumes (beans, groundnuts, Bambara nuts Chickpeas) 12,200 ha.

Cash crops are Cotton, 49,500 ha, average yield 0.8, Rice, 14,724 ha. Average yield 2.4 and Horticultural crops cover about 476.5 ha.

ii. Livestock:

Apart from farming, livestock keeping activities are also being practiced. The type of animals kept includes cattle, goats, sheep and pigs. In the study area a good number of cattle is kept and livestock keepers requested the project to provide enough cattle trough to water animals particularly during dry seasons. Mwamkala village keeps cattle 3,200, goats 300 and sheep 150. However the district keeps a good number of livestock as shown in the table below: -

Table 4: Number of Livestock in the district

S/N	District	Cattle	Goats	Sheep	Chickens	Donkeys	Pigs
1	**Magu**	**295,288**	**110,738**	**68,699**	**200,000**	**163**	**198**

Source: Magu Socio-economic Profile, 2011

iii. Forestry:

Afforestation to a large extent is practiced in the district as a whole. However there are some hectares under natural forest reserves which is 8,170 hectares and hectares planted trees to date is 436 hectares while trees planted since January 1999 to date are 15,215,610. Tree felling, uncontrolled cattle grazing and wild fire were claimed to be the major source of constant drought in the area.

iv. Fisheries:

Magu district has 1725 Km^2 of area under water whereby fishing industry is carried out. Only small – scale fishing is carried out in the lake and the average harvest per annum is 5,760 tonnes, worth Tshs. 710,569,054= which contributes 10% to DGDP.

v. Wildlife:

The district has only one Game, Reserve known as Kijereshi with the area of 65.72 km^2 and the reserve is now managed as a National Project.

vi. Industrial Development:

The district lacks large – scale industries. Types of industries found include:-Medium – scale industries which are 4 cotton Ginneries (Nassa, Magu, Ngasamo and Aquva), of which one is private (Aquva) and one fish processing industry at Busulwa. Small scale industries are comprised of carpentry, wielding and auto garages.

vii. Road Infrastructure:

Despite the roads being the major means of transport inside and outside the district, the district has a poorly developed economic infrastructure, especially in the rural areas, which has contributed to low – living standards. However the road types found in the district are:-

- Trunk road, from Mwanza to Tarime with a length of 123 kms. This is passable throughout the year.
- Regional roads, with a total length of 162 km. of which 129 kms is gravel and 33 km is earth. Only 80 km. (49.8%) are passable throughout the year.
- District road network is 570 kms, of which 301.1 km. (53%) are passable for all seasons.

viii. Marine Transport:

This type of transport is carried out in Lake Victoria using boats and dhows, and mostly is used for goods/merchandise transport. Islanders also use this type of transport to and from the mainland.

4.2.5 Provision of Social Services

Social services involve education, water supply and sanitation facilities, and health. The analysis focusing on Education sector offers a serious debate on primary schools, enrolment rates and the problems facing primary schools as well as discussions on Secondary education and teachers. In items of health sector, the aspects covered include morbidity, mortality and health facilities. The Profile also discusses issues relating to rural and urban water supplies as well as sanitation issues.

i. Education Sector:

The number of Primary Schools in the district is 194, whereby 188 are Government and 6 are Private while Pre-Primary schools is 128, of which 121 are governmental, and 7 are privately owned and total pupils is 112,285.

Gross Enrolment Rate (GER) is 120.4% for boys and 122.5% for girls which makes an average of 121.5% in 2006 and became 98% in 2011. This shows the efforts of the district in enrolment that even pupils above 7 years were enrolled at the beginning but reduced in subsequent years. Net Enrolment Rate (NER) is 100% to each sex. This implies that all school aged children were enrolled in schools. Despite the good NER, the rate of drop out is 7%. It shows that many children leave school before completing standard seven and main reasons are truancy, early pregnancy, illness and alike. The district has shown some improvements in education delivery in reducing desk to pupil ratio into 1.3, book-pupils ratio into 1:5. However the challenge remains in construction of latrines where the ratio stands at 1:66 instead of 1:20 for girls and 1:25 for boys.

Regarding secondary education there are 25 schools (22 governments and 3 private).
Adult literacy rate is 26% and the number of people who do not know the three RS Read, Write and do, Arithmetic is 46,109, (16,273 men and 29,836 women).

ii. Health Sector:

The district has 2 hospitals, of which one is government owned, 46 government dispensaries. There are 6 health centres, all government property. These facilities do not meet the district requirement of 4 hospitals, 8 health centres and 80 dispensaries. The top ten diseases affecting the district are Malaria, ARI, Diarrhoea, Pneumonia, worms, Eye infections, Anaemia, Skin infections, STD/HIV/AIDS and Ear infections. Severe malnutrition is about 2.3%. Infant Mortality rate is 140/1000 while those under five years mortality rate is 168/1000 and maternal mortality rate is 529 /100,000.

The HIV/AIDS prevalence rate is 8.2% where as Sexually Transmitted infections (STI_s) prevalence is 4.7 and Syphilis prevalence is 11.7%. The STIs/STDs and syphilis are indicators of high-risk HIV/AIDS infections.

Factors contributing to $HIV/AID_s/STI_s$ in the district include Socio – cultural factors such as beliefs in witchcraft, traditional dances and weekly markets ("Magulio").

iii. Sanitation:

Overall sanitary situation in the district is about 68%. There are no drainage systems, refuse vehicles, cesspit emptier and specific dumping areas. Cleaning is done on daily basis and house-to-house inspection on quarterly basis.

iv. Water Sector:

Busega district water sources are shallow and medium wells with pumps, improved traditional wells, dams, Charco Dams, rain – water-harvesting system (Tanks) and Rivers. Most of these sources are functioning. Some shallow wells dry up during extreme conditions of drought.

Table 5: Water Facilities in Rural and Urban Water Supply

RURAL		**URBAN**	
Type of Facility	No.	Type of Facility	No.
Pumping schemes	10	Pumping scheme	1
Shallow water wells (with pumps)	641	Shallow wells with pumps	475
Medium boreholes (with pumps)	189	Medium bore holes with pumps	2
Improved traditional wells	119	Rain water harvesting tanks	6
Dams	8		
Charcoal dams	14		
Rain water harvesting tanks	32		

Source: Magu District Socio-economic Profile, 2011

In rural areas the number of people/percentage of people getting clean water within a distance of 800 metres is 40% and people getting clean water within a distance of 400 metres is 18%. There are 825 Water user groups (WUGs). In urban areas percentage of people getting clean water within a distance of 200 metres is 43% and the overall water supply situation in the district is only 62%.

v. Demands for Charco Dam:

As noted above, the annual rainfall is bi-modal with the short rains in October to December. January and February are dry periods. The heavy rains occur in March to May. Annual rainfall ranges from 700mm to 1,000 mm. Due to terrain and other geographical features the area reserve little water and therefore people walk long distances for search of water particularly for livestock. The climate of the area encourages high amount of evaporation causing most of the rivers to be seasonal and only hold surface water during or shortly after the rains. The districts' climate can be classified as arid, semi arid and sub humid with a decrease in rainfall distribution from North to South. The southern part of a district where the project is located receives a mean annual rainfall of 400mm per year. Mwamkala village prioritized the sub project of Charco Dam construction under the project of LVEMP II as one of the strategy to reduce environmental degradation by reducing concentration of livestock and human activities to Simiyu River. The dam project will provide water to livestock, domestic use, tree nursery watering and small scale irrigation and aquaculture activities. Hence through this proposed sub project will reduce soil degradation and replace horticultural activities along the river.

4.3 Biological Environment

The study was undertaken on June 2012 by the specialist unit of Environmental BENCHMARK to assess the impact of the proposed development on existing organisms (flora and fauna). The study was undertaken to investigate the fauna, flora and ecological function and importance of the area.

As it is clearly known that development projects have both negative and positive environmental impacts as they involve vegetation clearing which supports lives of other animals through supply of food and shelter. The review of the List of IUCN Threatened Plant Species Categories (Version 2009) which falls under Extinct, Extinct in the Wild, Critically Endangered, Endangered and Vulnerable categories was carried out. In the project area, none of the plant species in these categories were identified.

Figure 7: Existing situation at the project site showing the cultivated land

The findings on flora and fauna discovered that the area for Charco Dam development falls within an area that has not been protected from human activities and therefore no special ecological feature was noted due to the diversity of activities carried out in the area and that there are common plant species such as maize, cotton, sorghum, maize, cassava, paddy and

cow peas which are found in most of the areas. No wild animals as well were observed at site during the site visit.

On completion of the project, the villagers under the guidance of Water User Committee will establish new tree nursery and plant seedlings of trees to the surrounding areas in order to have some vegetation to compensate for the vegetation that will be lost.

4.4 Simiyu River Baseline Condition

Simiyu River catchment area is about 11,577 km^2 and covers 188 villages in 48 wards. The districts in the catchment are Kwimba and Magu in Mwanza region and Bariadi, Maswa, Meatu, Itilima and Busega in Simiyu Region.

Short rains appear in November and December and long rains in March-May resulting to total annual rainfall of 700 mm to 1000 mm. The average temperature is 23^oC.

The districts within the catchment had the total population of 2,504,137 people in 2011 with growth rate of 3.2%.

85% of resident in Simiyu River catchment depend on cultivation, 10% depend on both cultivation and livestock keeping while the rest 5% depend on other activities e.g. fishing, employment and business.

Simiyu River annual mean discharge is 48.5 m/s. Nutrient loads are: TN is 1,695 t/y and TP is 1,904 t/y (Source: LVEMP II Tanzania Environmental Baseline Data, 2011).

Out of 1,157,700 ha (11,577 km^2) of Simiyu River catchment, 42.2% is cultivated land, 14.5% is bush land, 12.7% is cultivated seasonal swamp, 10.5% is grass land, 3.5% is occupied by bush land with scattered cropland and the remaining 6.5% is village settlements.

Thus, in the catchment, LVEMP II intends to reduce the area affected by soil erosion, increase the forest cover, reduce the amount of sediments in Simiyu River, reduce the area covered by water hyacinth, reduce phosphorus and nitrogen entering the river, increase the number of people with awareness on environmental management, increase the number of people with access to safe and clean water, improve agricultural productivity for main crops and income levels to the community within the catchment.

5. Stakeholders Consultations and Public Involvements

5.1 Introduction

Stakeholders' consultations and public involvements in the initial stages of the project are of great importance particularly during PEA study as well as the planning, design and implementation of the proposed development.

Thus, the overall goal of the consultation process was to disseminate project information and to incorporate the views of the community in the design and mitigation measures against negative social impacts

Stakeholders' consultation and public involvement involved necessary potential Interested and Affected Parties (I&APs). The comments received and issues raised from these public participation exercises have been incorporated into the PEA report and used in determining mitigation measures for the project. These exercises achieved the following:

- a vehicle for public input and facilitated negotiations
- it created trust and partnerships;
- negative impacts are minimized;
- positive impacts are enhanced; and
- It provided an up-front indication of issues that may prevent project continuation, that can cause costly delays at a later stage, or result in enhanced and shared benefits.
- This instils a greater sense of ownership by the community, who are then more likely to engage in the active maintenance of the Charco Dam, reservoir and catchment area.

5.2 Stakeholders' Consultation

Issues pertaining to construction of the Charco Dam and its environmental and social consequences were discussed with the key stakeholders and interested members of the communities in the vicinity of project area in Magu district.
The key stakeholders who were involved are listed below:

- Magu District Commissioner (DC)
- Magu District Administrative Secretary (DAS)
- Magu District Environmental Management Officer (DEMO)
- Magu District Community Development Officer (DCDO)
- Magu District Forest Officer (DFO)
- Magu District Land Officer (DLO)
- Magu District Health Officer (HO).

5.3 Public Involvement

On 21nd June 2012, the surrounding communities in Busega district were sensitized to participate in the meetings. For this site familiarization, notification letters were served to Mwamkala Village Executive Officer to inform the community to participate in consultation meetings. On 26th June 2012, the meeting was held at Mwamkala village to discuss on the proposed Charco Dam construction.
The proposed project area is located in an area where they share the land for grazing, stone crushing and cultivation. It is therefore anticipated that the communities will have to be protected from any negative impacts, while opportunities to be offered by the project need to be made visible to the communities. These various groups likely to be affected by the project

were involved in raising their concerns on the project and proposed some mitigation measures.

5.4 Concerns drawn from Public Involvement

Public participation process followed the guidelines as stipulated in the Environmental Management Act Cap 191 part XIV regarding Public Participation in environmental decision-making and also followed EIA and Audit Regulations, 2005. In order to facilitate an open and transparent process, Interested & Affected Persons were identified. Comments/concerns received during all phases of PEA study have been incorporated and are addressed in the PEA report.

5.4.1 Issues from the public meeting at Mwamkala village

The villagers were quoted:

(i) We are aware of the project and we are waiting for implementation but we were not aware of what is going on.
(ii) What we need is the dam to be of sufficient depth and strong embankment so that it can hold water throughout the year.
(iii) They were eager to know when the project construction will start.
(iv) They said that about 50% of the households in Mwamkala village do not have toilets or pit latrines; the faecal matters spread in their compound. They agreed to start the campaign among themselves which will aim at educating others to construct the toilets in order that they can avoid pollution to the catchment which may lead to the pollution of the expected Charco Dam.

i. Perceived positive Impacts of the Project

People in the study area are eager to get the dam constructed. Such feelings emanate from their expectation that the dam will bring the following advantages to their localities:

- Constant water supply for cattle and irrigation and for domestic use due to the fact that they have inadequate water supply, so they use water from ponds which is not safe.
- Availability of water will reduce dependence in River Simiyu where cattle are taken for water and eventually contaminate the water.
- Fishing may be introduced and add both nutritious food and income to the entire village population as well as nearby villages.
- During dam construction there will be employment opportunities to local people (youths and women) either directly or indirectly. Through employment local people will acquire capital for further investments. Indirect impact is for women to carry out businesses such as selling of food staff to the dam construction employees and casual labour employment.
- Stimulation of technology and skills is another positive impact. There will be interaction and exchange of technology between the local people and the new immigrants hence stimulate the adoption of new technologies.
- Generally, the construction of the dam will have tremendous positive impacts on the village and district economy and the entire nation.

ii. Perceived negative Impacts of the Project

People worries over the project include the following:

- Increase of water-borne diseases due to poor sanitation services in the village whereby faeces may flow downstream to the dam.
- Children may be drowned if thorough preventive measures are not taken constantly.
- Agricultural and grazing land will be reduced especially the land used by the school for self reliance activities.
  But, the land is for the village government, not for school. The village council used to provide the land to the school for free for temporary use.
- Environmental degradation resulting from noises, dust, tree cutting, soil erosion and air pollution.
- Culture interference may cause moral decays among the youth.

iii. Options during Dam Construction

The respondents in the study area and other stakeholders had their views which they would like to be considered during the construction of the dam

- The size of the dam may attract many fishermen so fishing sites should be considered
- Provide enough cattle trough few metres after embankment
- Provision of buffer zone to avoid siltation
- Improve sanitation facilities in the village to avoid water contamination in the dam
- Train the community on proper agriculture to reduce soil erosion which eventually will make sedimentation in the dam.

Figure 8: Mwamkala villagers during public consultative meeting

6. Identification of Impacts and Corresponding Mitigation Measures

In any development project, a number of minor to major environmental impacts are likely to occur. For this project, the impacts arise from the planned activities ranging from site clearance to transportation of construction materials, construction and operation phases. Such potential environmental impacts are described below.

6.1 Identified positive impacts in general

Table 6: Identified positive impacts of the project and enhancement measures

S/N	Positive Impacts	Proposed Enhancement Measures
1.	**Reliable supply of drinking water for livestock** The proposed Charco Dam construction will be useful to livestock keepers as it will reduce the walking distance to look for drinking water for livestock.	The area where troughs will be constructed should be designed and constructed in such a way as to avoid soil erosion resulting from concentration of livestock.
2.	**Reliable supply of water for domestic purpose** The residents of Nyaluhande ward depend on the surface water from the Rivers and ponds for domestic water; thus, construction of the Charco Dam with the domestic tap point will reduce time wastage and walking distance to look for water.	Sufficient domestic points have to be installed depending on the number of water users. The taps should be away from troughs in order to avoid interference with livestock and destruction.
3.	**Reliable supply of irrigation water** Completion of the Charco Dam construction will ensure improved and reliable supply of irrigation water to irrigate the crops such as tree nurseries surrounding the project area.	Construction of the outlet canal and control structures will be necessary for farmers.
4.	**Increased production of crops** With available water supply, crops production will increase, and will facilitate introduction of new species of crops which were not initially cultivated in the area.	Production of food crops have to be given high priority in order to ensure that household food security is achieved.
5.	**Increased income, poverty alleviation and food security** With the increase in crop production, the standard of living of the surrounding communities will improve and with improving social service more people will be attracted to stay in the village especially youths.	Busega district authority will have to conduct capacity building in order to enhance the benefits of the proposed project.
6.	**Opportunities for temporary employment** Charco Dam construction works require both skilled and unskilled labour. The project will create job opportunities for youth living in villages where the project is implemented. However, this may lead to migration of youth from neighbouring villages in an attempt to seek better opportunities a result of exposure from social interaction with the migrant population. Also school pupils may abscond from school to go for works in construction sites.	The contractors will have to employ youths who register with village government offices since they (village leaders) will know if the youth has completed the compulsory primary education.

7.	**Creation of new businesses opportunities at the construction site** Communities living near the project area will exploit new business opportunities. Food vendors (*Mama Ntilie/Lishe*), fruit vendors are anticipated to work in the area investing in both long and short-term ventures.	Food vendors will have to have their own isolated area and should be educated and provided with waste management facilities such as dust bin or cans and landfill.

6.2 Negative Impacts

6.2.1 Mobilization Phase

The issue of land acquisition is not a problem as the villagers have compensated the land owner. However, no underground facilities were observed in the project area. The identified impacts are described below.

i. Loss of Land

People who are using the land will lose their land.

Mitigation measures will include

- Fair and prompt compensation to all affected persons.

ii. Loss of natural aesthetic value

Loss of natural vegetation is expected to inundation along the seasonal river course. The type of vegetation available will not be able to exist in high water level, they will dry up. However, at the project area, about 80% of the vegetation is already cleared as a result of cultivation and grazing, the major vegetations available are grasses.

Mitigation measures will include;

- Avoid unnecessary clearance of trees and vegetation covers near the embankment or borrow sites.
- Vegetation clearance should be limited to areas which will receive permanent works
- The Busega district council should sensitize the community on the importance of tree planting around the project area to bring back the natural appearance of the area or blend the reservoir with the surrounding environment.

iii. **Generation of solid waste**

Solid waste will be generated during site clearance. The vegetation (trees, grass, and all other sorts of rubbish) that will be cleared from the site will lead into generation of huge volumes of waste that requires proper disposal.

Mitigation measures will include;

- Site keeping to minimize waste generated from such works
- Allocate a special area for petty business such as food stalls and provided with garbage bins.
- Assign Contractor's Environmental or Safety Officer the responsibility to ensure that the surroundings are kept clean

- All excavated spoils should be well managed through levelling or tipped into borrow areas which are no longer useful.
- Biodegradable wastes will be buried in the trench and covered with soil. The size and location of the trench will be decided by the project Engineer.
- The community should instruct children to stay away from scavenging

6.2.2 Construction Phase

i. Land scarring due to Cut and fill materials

Site preparation and construction practices will result into removal of the existing vegetation and also soil for building up other areas. Construction will remove protective plants cover over the existing ground. Also the site earmarked for the reservoir will be rendered bare to allow the stored water free of decaying organic matter.

Mitigation measures

- Borrow materials to be used for embankment and canals construction will be collected from the identified borrow areas such as those used for road construction or new ones opened on agreement with the village government and land owners.
- Once these borrow pits are no longer in use, they will be backfilled with the spoil or made as water storage points for livestock. The edges of these pits will be smoothened to avoid posing risks to children and livestock. Also borrow pits sides will be landscaped after work completion.
- Where construction materials such as gravel and stones are to be obtained from village lands, the material shall be purchased and this will be officially negotiated with villagers and/or village government in order to avoid conflict.

ii. Soil erosion

Soils from disturbed surfaces on farms and access roads are likely to be washed away if the works are executed during the rainy season. If cut and fill sites are not protected, loose soils can soon be washed away into the reservoir. This may also speed up the rate at which the reservoir is filling up with sediments. Also grazing activities in the proposed area contribute to soil loose there by accelerating soil erosion and sedimentation.

Mitigation measures will include:

- Implementation of erosion control measures in the water shed- these measures will involve planting vegetation that hold soils together such as grasses, terracing in steep slopes, gully construction and control, creating a buffer zone for the dam, applying rip -rap technique, fencing the dam's buffer zone and planting sisal around the buffer zone and securing available vegetated land area.
- Imposing restrictions on grazing in the catchment area and zoning the land for different purposes in liaison with respective communities.
- Unnecessary ground clearance shall be avoided.

iii. Soil pollution during civil work construction

The equipment especially the material hauling tracks may be passing through different routes in the agricultural fields during hauling of construction materials such as clayey

soil, aggregates, sand and gravel and might contaminate the soil with oil and fuel spills.

Mitigation measures will include;

- Use vehicles which are in sound conditions i.e. those without fuel and oil leakages
- Good selection of vehicle routes in order to avoid passing through agricultural fields.

iv. Air pollution from dust and fumes during civil work construction

The machines used in the construction of civil works will produce exhaust smoke and fumes that may be unpleasant to the surrounding communities. In addition the machine will pollute the area with dust.

Mitigation measures will include;

- Water sprinkling in dusty areas to reduce the dust
- Use of dust masks and goggles by operators and those working in dusty areas
- Construction machines/equipments shall be well maintained to ensure optimum fuel combustion. All the vehicles shall be frequently checked and serviced during the whole construction period so that the levels of exhaust emissions are reduced.
- Movement of vehicles to and from the project site shall be kept to minimum necessary for completing the job.

v. Noise pollution during civil work construction

The vehicles used in the civil works will produce noise that may be unpleasant to the community who live near the project site.

Mitigation measures will include:

- Where the noise level is beyond 85 dB (A), ear morphs or plugs shall be provided to all those either operating or working within the construction site.
- Equipment shall be well maintained or fitted with noise silencers such as mufflers
- Select machinery yard not too close to residential premises
- During construction activities, the contractor should only work during the normal hours so that villagers living close the site are not disturbed during sleeping and resting hours.
- Advance notice to local communities

vi. Contamination of water such as from leakages of fuels and lubricants from the construction equipments, fertilizers and poor hygiene

It is likely that underground/surface waters will be contaminated with lubricants and fuel leakage during machines servicing and refuelling.

Due to the nature of the catchments animal manure and human excreta will be washed away into the reservoir as livestock are kept and graze near the catchment.

Animal manure and human excreta are likely to be washed away into the reservoir as livestock are kept and graze near the catchment. Loading the reservoir with nutrients will again lead into explosion of algal blooms which deplete dissolved oxygen causing death of fish and other aquatic organisms.

Also during operation of the project, the farmers will normally be using pesticides and fertilizers in their fields which may eventually be washed into the stream.

Mitigation Measures will include:

- During construction–machines will be properly serviced and checked to make sure that they do not leak (lubricants and fuels)
- No machine refuelling shall be carried out within 200 m of the water source
- During project operation farmers will be sensitized to use proven environmentally friendly fertilizers.
- Catchment residents will be sensitized on using improved pit latrines to contain human excreta, keeping livestock outside the catchment and using troughs for livestock.
- Dripping pans shall be used while servicing the construction equipment.
- Any construction equipment dripping oils and lubricants shall be withdrawn from work until the leakages are sealed.
- Dripping pans to be used to contain all hydrocarbon leakages on construction equipments
- Refuelling should be done at designated areas
- Practice good housekeeping

vii. Involvement of child labour

Due to the nature of the area there are possibilities, children may abscond from school and come to the Charco Dam site looking for employment.

Mitigation measures

- Conduct sensitization and awareness to communities in relation to child labour and truancy.
- Ensure that casual labours are recognized by village/*sub-village* government leaders in order to avoid/combat child labour during construction phase.

6.2.3 Operation Phase

i. Increase in water related diseases

The Charco Dam may increase the extent of water-related diseases and improve the breeding conditions of the disease causing organisms and their intermediate hosts. The water-related diseases include typhoid, cholera, dysentery and several tapeworm and roundworm diseases. Several serious diseases have intermediate hosts linked to water. This applies to schistosomiasis (bilharzias) the snail fever, malaria, filariasis, sleeping sickness and yellow fever.

Reservoirs with large, stagnant waters and slow water level variations, less surface agitation offer favourable living conditions to pathogens. Vegetation in the reservoir also offer improved living conditions for several types of infection carriers in terms of supply of nutrients, improved conditions for breeding and protection during low water levels. Moreover, the aquatic vegetation shields disease carriers from strong

sunlight. In addition, research reveals that mosquito species carrying malaria and filariasis are hatched due to vegetation in dams.

Mitigation measures

- Constant variations on water level, water surface agitation, control of aquatic vegetation in the reservoir and improvement of sanitation condition especially at the upstream side.
- The toilet will be constructed at site so that it can be used by project personnel throughout the project phases.
- During the campaigns on prevention and control of HIV/AIDS, the community will be educated on transmission and prevention of diseases such as water related diseases, water borne diseases and faecal oral routes etc.
- A fish, *Tilapia Nilotica that* feeds on mosquito larvae can be raised in the proposed Charco Dam to reduce the risk of malaria. Mudfish, which can survive even when small dams dry up, can also be raised to increase food supply and cash income to the respective community.

Figure 9: Tilapia- common fish in Lake Victoria that can be introduced in the Charco Dam for multipurpose benefits.

ii. Water contamination

Farmers may start using different pesticides and fertilisers in their fields to increase their produce. This practice will eventually be allowing all the dirt to be washed away into the reservoir. Nutrient in form of phosphates and nitrates increase in the reservoir can be dangerous due to stimulating rapid growth of aquatic vegetation and algal blooms in the reservoir. Rapid growth of aquatic vegetation may deplete oxygen and result into death of fish and other aquatic life.

Due to the nature of the catchment, all animal manure and human excreta may be washed away into the reservoir. Loading the reservoir with nutrients will again lead into the process referred to as 'eutrophication'. Even without industrial-scale agriculture, the nutrients coming from a few activities in the catchment may be trapped in the reservoir of the proposed Charco Dam thus undermining reproduction of important species, including fish, molluscs and crustaceans. In extreme cases, the consequences can include smaller fish yields, fish death and ecosystem instability or collapse.

The community will be educated and will have to understand that no activities such as washings, dumping, swimming and drawing water will take place direct in the reservoir; instead, only the domestic points (taps) will be used.

iii. Soil erosion and siltation of the dam reservoir

Soil erosion may occur in many ways in the catchment; from agricultural activities, livestock activities. Siltation of dam reservoirs will shorten the lifetime of dams unless proper soil conservation is implemented in the catchment areas.
Also soil erosion may result from congestion of livestock at the troughs when drinking water.

Mitigation measures

- The design for the troughs should consider the issue of soil erosion and thus construct erosion control structures especially along the livestock routes to and from the dam/trough.
- Spread and compact the aggregates to a depth of at least 5 inches around the drinking area will help to reduce soil erosion. Also paving the drinking area can also reduce soil erosion
- Planting of grasses in areas which are at risk of being eroded will help to reduce soil erosion

iv. Soil Salinity

Normally, intensified agricultural production on an irrigated land eventually lead to reduced soil fertility over time, making it more saline. This will make soils limit type of crops that can grow and may lead into farmers abandoning the fields. Salts accumulate in soils in four different ways:-

i. Irrigation water containing salts will evaporate leaving the salts to accumulate
ii. Artificial or natural fertilizers may not all be absorbed by plants, leading to accumulation in the soil
iii. Salts may occur naturally in the soil aggravated by lack of enough rain to leach it away
iv. If water table is high, it may evaporate through capillary action leaving the salts behind in the soil.

Mitigation measures will include:

- Design system that allows leaching of salts with excess water
- Alternate irrigation methods and schedules
- Adjust crop patterns (fallow times, crop selection etc,.) to prevent salt build up
- Consult soil scientist for using soil additives (say addition of gypsum before irrigation)
- Use of salt tolerant crops.

v. Dam Breach (uncontrolled flooding)

Perhaps the worst impact and constant fear caused by dams is the danger or catastrophic rapture of the dam-wall and flooding or sweeping away of whatever is found downstream, about once a year somewhere in the world! This risk is

small but not insignificant. A dam breach seldom occurs, but owing to enormous consequences which it may involve such as loss of investment, life and property, the likelihood and impacts of a breach ought to be assessed. Statistically, the combination of a flood in the upstream watershed of the dam and faults in the spillway are the most frequent causes of accidents. Secondary causes are the foundation errors or water seepage. At high water levels in the reservoirs, landslides of earth and rock from the embankment above or inside the reservoir may cause flood waves so massive that water may spill over the total or partial width of the dam and may lead to the dam itself being damaged.

Mitigation measures include:

- Proper detailed engineering design and sound construction of the dam by a reputable contractor
- Preparation of preliminary contingency plan such as evacuation measure and
- Zoning (limiting settlements downstream of the dam site) as the best practice to avoid such hazards.

vi. Water Logging

Water logging of soil is caused if the water supplied for irrigation exceeds the plants' consumption, the evaporation and the infiltration capacity of the soil. If water logging or water saturation occurs the groundwater table is lifted. This can have a detrimental effect to the plants and also it can lead to other health problems from water related diseases.

Mitigation measures will include:

- Supply of water according to the demand of plants
- Management of water and maintenance of the irrigation systems

vii. Loss of Natural Habitat

Mitigation measures will include:

- Close supervision of earthworks shall be observed in order to confine land clearance within the proposed dam reserve boundaries.
- Topsoil shall be stockpiled and used for reinstating flora along the buffer zone.

6.3 Health and Safety Measures of Workers and Local Community

viii. Health and Safety

Injuries and health problems associated with construction and use of the Charco Dam will be reduced through the implementation of the workers health, safety and first aid training programs. Worker's health and safety will be monitored through an occupational injury and illness reporting program, accident and near miss reporting and investigation protocols. To reduce the spread of STDs and HIV/AIDS there will be workers sensitization programs for workers and local community. Community leaders will be sensitised to cooperate with the contractor for success of this program.

ix. Risk to life

Strict measures are required to safe guard human health and safety in Nyaluhande ward against children and adults swimming in the dam. Also once dams are full there is a chance that dangerous reptiles like crocodiles may find it conducive for their life which is dangerous to human in the area.

Mitigation measures will include:

- Proper dam design with fencing material to control children from entering the reservoir for swimming
- Sensitisation and training of the communities regarding the risks associated with water related diseases and wild aquatic animals
- Constant surveillance to make sure that there are no unwanted species in the reservoir.

Economic and Socio-Cultural Impacts to Local Community

x. Influence on community life style

The construction of the Mwamkala Charco Dam, particularly use of the dam in agricultural activities will have a significant impact on the day to day lives of Nyaluhande ward Community such as increase in cost of living due to influx of workers and those migrating *(induced settlement* and *in-migration)* especially livestock keepers in the area due to improved life conditions including availability of drinking water for cattle. In case this happens then the communities may be more likely to exhibit behaviour that puts them at high risk for HIV/AIDS.

Mitigation measures will include

- Sensitization of the communities to know impending cultural threats and put them in a state of preparedness to deal with new life
- Village to introduce own by-laws and strictly follow them to avoid cultural impacts
- Along with project implementation, measures to reduce such influences must be introduced e.g. training, information, strengthening of village/institutional organization structures etc.

xi. Increased crime and social conflict

Due to prospects for development, many people will be attracted to the area. It is mostly likely that social behaviours that go along with the large gathering will give rise to crime and social conflict may increase.

Mitigation measure will include

- Sensitization of communities to shun away bad habits and initiation of programmes promoting appropriate moral-values.
- The village will form the Water User Association which will deal with such social conflicts in collaboration with the village government
- Introduction of social security services such as sub-policy station
- The surrounding community should enforce by-laws relating to criminal acts
- Village government may consider developing bodies to arbitrate or mediate conflict in the community.
- Village governments should make every effort to increase employment and to discourage idleness. Programmes such as games, choir, and players to keep youth active in some capacity should be developed.

xii. Water user and land conflicts

There might be land conflict in the project area following implementation of the project due to scarcity of land. During the operation phase of the project more land conflict may arise because it is likely for neighbouring communities to immigrate into the development area which may create some competition and conflicts in Nyaluhande ward. Also it is anticipated that there will be conflict between water users especially farmers and livestock keepers. The conflict will arise especially when the demand becomes more than supply. This situation could be possible in two ways;

- When the farmers develop more land for irrigation and thus the water required for irrigation becomes more than the designed demand!
- When the population and livestock increases through migration to the area

<u>The mitigation measure will include</u>

- The village will form the Water User Association which will deal with such social conflicts in collaboration with the village government
- The village community to hold a meeting and agree on the modality of sharing the little land resource available.
- The village government and the district officials should analyse the possibility of ensuring that every villager gets at least a small piece of land for use, such as for nursery
- Enforce some procedure in which some plots will be made available for renting at a relatively reasonable price
- The other way in which these imbalances can be addressed could be through creation of alternative livelihood options such as fish farming in the reservoir as it was also proposed by other villagers in the meeting. This can be made in such a way that villagers who will miss plots near the Charco Dam will be given first priority in other productive use of the project.
- Construction of troughs for livestock drinking in order to combat conflicts between farmers and livestock keepers.

7. Assessment of the Significance of Impacts

7.1 Approach for assessment of significance

The general idea of construction of the Charco Dam has been presented in the previous sections. The potential impacts of the proposed project have been listed under previous section. These impacts are now analysed into different categories based on the stakeholders' views and perceptions, the consultants experience in undertaking Environmental Impact Assessments and experience gained in other projects of a similar nature.

The approach used to assess the significance of the potential impacts and later assess the effectiveness of the mitigation or enhancement measures is to apply significant ratings to each impact based on objective criteria such as magnitude, extent and duration of that impact, to yield a final evaluation of the significance of impacts before and after mitigation measures are applied.

The application of significance rating reduces the number of variables which need to be considered by the decision maker, whist providing relevant information about the implications of the proposed construction of the Charco Dam. The assessment criteria are given on Table 6 below.

Table 7: First step assessment criteria for evaluation of impacts

First Step Criterion	Categories
Extent or Spatial influence of Impact	**Local/Site specific**; **Regional**; **National**; **International**
Magnitude of Impact at that spatial scale	**High**: natural and/or social functions and/or processes are severely altered **Medium:** natural and /or social functions and /or processes are notably altered **Low:** natural and /or social functions and/or processes are negligibly or minimally altered
Duration of Impact	**Short Term** (**ST**): 0-5 years; **Medium Term** (**MT**) 5-10 years; **Long Term** (**LT**): 15+ years

7.2 Criterion used during evaluation

Also other important criteria considered to evaluate whether or not adverse impacts are significant include:

- environmental loss and deterioration;
- social impacts resulting directly or indirectly from environmental change;
- non-conformity with environmental standards, objectives and guidelines; and
- Likelihood and acceptability of risk.
- Criteria to evaluate adverse impacts on natural resources, ecological functions or designated areas include:
- reductions in species diversity;

- depletion or fragmentation on plant and animal habitat;
- loss of threatened, rare or endangered species;
- impairment of ecological integrity, resilience or health e.g.
- disruption of food chains;
- decline in species population;
- alterations in predator-prey relationships.

Criteria to evaluate the significance of adverse social impacts that result from biophysical changes include:

- threats to human health and safety e.g. from release of persistent and/or toxic additives,
- decline in commercially valuable or locally important species or resources e.g. fish, forests and farmland;
- loss of areas or environmental components that have cultural, recreational or aesthetic value;
- displacement of many people e.g. by dams and reservoirs;
- disruption of communities by influx of a workforce e.g. during road construction
- pressures on services, transportation and infrastructure.

Environmental standards, objectives and targets to evaluate significance include:

- prescribed limits on waste/emission discharges and/or concentrations;
- ambient air and water quality standards established by law or regulations;
- environmental objectives and targets contained in policy and strategy; and
- approved or statutory plans that protect areas or allocate, zone or regulate the use of land and natural resources.

The environmental significance was determined using an assessment matrix shown on Table 8, through assigning the matrix at the intersection a value based on the scenarios of Very Severe Impact (not acceptable) for a score of -3 to an acceptable (very good) impact with a score of +3.

Table 8: Analysis of Environmental and Social Impacts

Environmental and Social Impacts	Analysis of Environmental and Social Impacts											
					Duration			Reversibility		Extent or Spatial influence		
Description of Impacts	Direct	Indirect	Primary	Secondary	Short term	Medium	Long term	Reversible	Irreversible	Local	Regional	Significance
POSITIVE IMPACTS												
During Mobilization												
Creation of short and long term employment opportunities	✓		✓		✓					✓		Medium
During Construction												
Creation of new businesses opportunities at the construction site e.g. Food vendors	✓		✓		✓					✓		Medium
Employment opportunities	✓		✓		✓					✓		Medium
During Operation												
Reliable supply of water for livestock	✓			✓			✓			✓		High
Increased income, poverty alleviation and food security		✓		✓			✓			✓		Medium
Reliable supply of water for domestic purpose	✓			✓			✓			✓		High
Increased production of crops		✓		✓			✓			✓		Medium
Reliable supply of irrigation water	✓			✓			✓			✓		Medium
NEGATIVE IMPACTS												
During Mobilization												
Land loss	✓		✓				✓		✓	✓		Medium
Vegetation Clearance for input to dam Engineering Design	✓		✓		✓				✓	✓		Medium
During Construction												
Disturbance**, particularly land scarring at borrow sites (cut and fill materials)**	✓		✓		✓			✓		✓		Medium
Contamination of water such as from leakages of fuels and lubricants from the construction equipments, fertilizers and poor hygiene	✓		✓				✓	✓		✓		Medium
Poor air quality from dust and emissions	✓		✓		✓			✓			✓	Medium

around the construction site and material hauling routes												
Generation and poor disposal of solid and liquid wastes	✓		✓				✓	✓		✓		Medium
Social-cultural changes		✓		✓			✓			✓		Medium
Soil erosion	✓			✓			✓	✓		✓		High
Vibrations due to compaction of the dam basement	✓		✓		✓			✓		✓		Low
Poor ambient air – noise pollution	✓		✓		✓			✓		✓		Medium
During Operation												
Soil erosion as a result of livestock movement	✓			✓			✓	✓		✓		High
Charco Dam sedimentation	✓			✓			✓	✓		✓		Medium
Landscape scars at un-rehabilitated borrow sites	✓			✓			✓	✓			✓	Medium
Increase in HIV/AIDs cases	✓		✓		✓			✓		✓		Medium
Increased breeding sites for mosquitoes and other disease vectors	✓			✓			✓	✓			✓	High

Table 9: Impact Assessment Matrix

Impact / **Activities during project phases**	**Mobilization Phase**				**Construction & Operation Phases**							**Demobilization phase**		
Description of Impacts based on Project Environmental and Social Components	**Land Acquisition**	**Sites Identification**	**Labour Force Hire**	**Transportation of construction Equipment**	**Site clearance & Camp Site construction**	**Charco Dam Construction activities**	**Domestic water drawing**	**Irrigation facility development on completion**	**Livestock drinking**	**Access roads construction**	**Aquaculture/fishing**	**Demobilization of Camp site**	**Reinstatement**	**Laying off labour force**
POSITIVE IMPACTS														
Opportunities for temporary employment.	0	0	+1	+1	+2	+2	+3	+2	+2	+2	+2	+2	+1	-2
Increased income	0	+1	+1	+1	+1	+1	+2	+1	+3	+2	+2	+1	+1	0
Availability of irrigation water	0	0	0	0	0	+1	+2	+2	+1	0	0	0	+1	0
Increased in crop production	0	0	0	0	0	0	0	+1	+2	+2	+2	0	0	0
Reliable Supply of domestic and livestock water	0	0	0	0	0	+1	+3	+2	+3	0	0	0	+1	0
NEGATIVE IMPACTS														
Land loss to pave way for Charco Dam project	-2	0	0	-3	-3	-3	0	0	0	-3		0	0	0
Vegetation loss through site clearance	0	0	0	-1	-2	0	-1	0	0	0	0	0	0	0

Soil erosion and sedimentation	0	0	0	-1	-2	-1	-1	-1	-3	-2	-1	-1	-1	0
Water contamination	0	0	0	-1	-2	-1	-1	-2	-2	-1	-2	-1	0	0
Soil salinity	0	0	0	0	0	0	0	0	0	0	0	0	-1	0
Soil pollution during construction works	0	0	0	-1	-1	0	-1	-1	0	-1	0	-1	-1	0
Solid waste generation	0	0	0	-1	-1	0	-2	-1	-1	-2	-1	-1	-1	0
Dam breach	0	0	0	0	0	0	0	0	-2	0	-1	0	0	0
Increase in water related diseases	0	0	0	0	-1	-3	-1	-1	-2	-1	-1	-1	-1	0
Land loss and fauna disturbance	-1	-1	0	-1	-2	0	-1	-1	0	-2	-1	-1	-1	0
Emissions – Air pollution	0	0	0	-1	-1	0	-1	-1	0	-2	0	-1	-1	0
Generation of noise and vibration	-1	0	0	-1	-1	0	-1	-1	-1	-2	0	-1	-1	0
Safety during construction	0	0	0	-1	-1	0	-1	-2	-1	-2	0	0	0	0
Poor health standard during construction	0	0	0	0	-2	0	-2	-1	0	-2	0	-1	0	0
Risk to life	0	0	0	0	0	-1	0	0	-1	0	-2	0	0	0
Influence on community life style	-1	0	0	0	-1	0	-2	-1	-1	-1	0	-1	0	0
Land conflicts	-2	0	0	0	0	0	0	0	-2	0	-1	0	0	0
Water use management and conflicts	0	0	0	0	0	-2	0	0	-2	0	-2	0	0	0
Increased crime and social conflict	-1	0	0	0	-1	-2	-1	-1	-2	-1	-2	0	0	0

Key:

+3 = major positive impact
+2 = moderate positive impact
+1 = minor positive impact
-1 = minor adverse impact
-2 = moderate adverse impact
-3 = major adverse impact
0 = no impact

8. Project Alternatives

8.1 Introduction

The EIA procedure stipulates that an environmental investigation needs to identify main project alternatives for any proposed development. Therefore, it is required that a number of possible proposals or alternatives for accomplishing the same objectives be considered. In principle, these should include an analysis of the location, timing, input and design alternative as well as the Do- Nothing option.
It should, however, be noted that during site investigation, location alternatives was limited to those areas in close proximity to existing project site where the opportunities and use of collected water could be maximized on the downstream side.

The following options were considered:

- Location and placement options
- Input and design alternative; and
- Do-Nothing option alternative.

8.2 Option Analysis for the proposed Mwamkala Charco Dam

Table 10: Analysis of alternative locations for the proposed Charco Dam

Options	Anticipated Impacts
Option 1 **Upstream of the Proposed Location**	*Environmental and socio-economic issues* - Insufficient catchment area, thus the expected dam capacity cannot be achieved - The site is occupied by settlements, thus, the impacts of relocation and property will be much higher compared to the site downstream
Option 2 **The proposed location**	*Environmental and socio-economic issues* - Sufficient catchment area - Lesser communities residing downstream of the proposed site – threat to damage of property and loss of life is minimised - More arable land for agricultural activities downstream - Compensation for land will be affordable - Most of the area is deforestated - Strategically located to minimise disturbances to physical features - Easily accessible by livestock from different directions
Option 3 **No-project or Do – nothing**	- The no-project or do-nothing option in this case would imply that the status quo of the environment would be maintained and that environmental pollution along Duma and Simiyu Rivers banks has to continue.

Following the above analysis, the environmental and social impacts assessment focused its findings on the identified and the present location whereby the study has identified and discussed the anticipated potential impacts and suggests possible mitigation measures to minimize detrimental impacts.

Therefore, Environmental BENCHMARK recommends that the construction of the proposed Charco Dam on the proposed site (i.e. Option 2) should proceed on the condition that proper planning is implemented and the construction activities adhere to all the proposed mitigation measures detailed in this report. This precautionary approach will reduce the impact on the ecological systems in the area.

9. Environmental and Social Management Plans

9.1 Introduction

The objectives of Environmental Management Plan (EMP) are to describe;

-the legislative and administrative frameworks in the country on Environmental Impact Assessment Management,
-implementation arrangements for the EMP,
-the environmental monitoring programme and reporting arrangements and
-design consideration regarding environmental, health and safety and social impacts.

In Tanzania the Environmental Assessment framework is guided by the following two key national legislations:

- The Environmental Management Act (EMA) No. 20 (Cap 191) of 2004
- The Environmental Impact Assessment and Audit regulations, 2005

Environmental Impact Assessment for any development project is administered and approved by the Vice Presidents' Office, where the Minister for Environment falls. Therefore for environmental assessments for the proposed project, the responsible institutions are:

- Minister for Environment who approves the EIA and gives the environmental permit,
- NEMC, who arranges for EIAs, undertakes enforcement, compliance, review and monitoring of EIA.

9.2 Implementation Arrangement of the EMP

The project proponent is the Ministry of Water who will be assisted by the Designers and Supervisors from Busega District Council during construction phase. During operation phase of the Charco Dam, the Mwamkala villagers will form the Water User Committee which will work under guidance of Busega district council authority; the committee will be managing all activities of the project. In case the committee meet the crucial challenge, then it should report to the district authority. The Mwamkala Village Council is well prepared to manage the project.

To minimize potential environmental and social negative impacts, the project will require the support of various institutions in the project area. Table 10 below outlines the actions of the EMP. The organizational framework for the EMP is designed to evolve as the project progresses through pre-construction, construction and operation phases.

9.3 Reporting Arrangement of the EMP

During construction phase, Environmental Representative from Busega District Council to deal with Environmental Management will cooperate with other experts such as District Land Officers, District Valuers and Community Development Officers to provide the Regional Environmental Management Expert with environmental reports of the project implementation as part of the progress reports and annual environmental monitoring reports. The Regional Management Expert is the link person between the region and the Director of Environment as well as the Director General of NEMC.

Table 11: Environmental and Social Management Plan

Environmental and Social Impact	Indicator- mitigation target	Responsible for mitigation	Time Frame	Estimated Cost TZS
Land loss	Fair and prompt compensation to the land owners	Busega District Council in collaboration with Mwamkala village government and villagers	During mobilization	800,000 (contingency only – the land belongs to the village)
Vegetation loss during Site clearance	Limit clearance to (3 ha) areas required for permanent works	Villagers / Supervising Engineer / District Natural Resources or Forestry Officers	During preliminary works for Charco Dam and access road construction	400,000
Soil erosion and Sedimentation	Erosion control measures are put in place. Grazing and cultivation activities are not taking place in the slopes of the catchment area.	Villagers/Supervising Engineer/District Environmental Officer.	Monthly routine throughout project life.	300,000
Water / Soil Contamination	Both liquid and solid management and sanitary measures are sufficiently practiced	Villagers/Supervising Engineer	During Charco Dam constructions and agricultural activities	200,000
Soil salinity	Salts are limited in a designated area with effective leaching mechanisms	Villagers/District Irrigation Officer in collaboration with Environmental Officer	During operation phase	600,000
Loss of natural aesthetic value	Vegetation clearance kept as minimum. Replant trees including wind breakers.	Villagers / Contractor and Sup. Engineer	During construction phase	200,000
Poor air quality from Charco Dam and access road construction works	Water sprinkling, PPE, sound service, speed limit	Villagers / Contractor and Sup. Engineer	Weekly during construction	300,000
Solid wastes generation	Sanitary measures practice at house level, Collect, segregate, compost, recycle etc of Waste generated during construction works.	Villagers/ Supervising Engineer	During construction works and operation activities.	250,000
Dam Breach	No damaged properties downstream of embankment and	Villagers /Contractor and Supervising Engineer	During dam operation	250,000

	associated structures			
Health and Safety	Sensitization	Villagers/ Community Development Officer	During site preparation and construction phase	500,000
Noise pollution during civil work construction	Sound insulation	Contractor and Supervising Engineer.	During construction	260,000
Land loss and fauna disturbance	Limit to necessary area and land dispute to be settled by respective authorities	Villagers/ Contractor / District Natural Resources or Forestry Officers and Irrigation Officer	During construction and whole period of project implementation.	420,000
Soil pollution during civil work construction	Ensure no fuel or lubricant leakages	Villagers/ Contractor and Supervising Engineer	Weekly during construction	260,000
Water Logging	No stagnant water in the project area	Villagers/ Contractor/ Supervising Engineer and Irrigation Officer.	During Construction and Operation phases	200,000
Increase in Water related diseases	Minimal or no water related diseases	Villagers and Environmental Health Officer	During Construction and Operation phases	200,000
Risky to life	Sensitized community and well fenced dam to restrict entrance from children and animals	Villagers/ Contractor/ village government/ District Natural Resource Officer	During Construction and Operation phases	200,000
Influence on Community Life style	Sensitization of the communities to know impending cultural threats	Busega district council/Village government	During Operation phase	200,000
Increased crime and social conflict	Sensitized communities against bad habits and no offences within the communities in relation dam use	Villagers/ Supervising Engineer/ respective village government	During Construction and Operation phases	200,000
Water user & Land Conflicts	Every villager gets access for livestock drinking, to domestic water tap and water for irrigation	Villagers/ Village government and dam committees.	During Operation phase	300,000
Total Estimated cost for ESMP				**6,540,000**

10. Environmental and Social Monitoring Plans

10.1 Introduction

Monitoring is the long-term process that normally begins at the start of the project and should continue throughout the life of the project. Its purpose is to establish benchmarks so that the nature and magnitude of anticipated environmental impacts are continually assessed. Therefore, monitoring involves the continuous or periodic review of mitigation activities to determine their effectiveness. Consequently, trends in environmental degradation or recovery can be established and previously unforeseen impacts can be identified and dealt with during the project's life. This plan specifies the type of monitoring, who will do it, how much it will cost to carry out monitoring and what other inputs, such as training, are necessary.

Environmental audits are also usually carried out some few years after completion of the project. Auditing involves assessment of the relevance, efficiency and impact of any mitigation measures administered. Environmental Officers in Busega District will initiate audit processes.

Since the project is divided into three distinct phases, design, construction and operation, the contractor should prepare an environmental management plan which will cover the construction phase of the Mwamkala Charco Dam. In the construction phase, there are stages that include mobilization, construction, commissioning, demobilization and a fixed operational monitoring during the defects liability period. Tasks to be covered and monitored during each phase are presented below.

Mobilization phase

- appointment of the Health, Safety and Environment (HSE) Officer
- maintenance and checking of construction equipment ready for transportation to site and during the actual construction works;
- training and sensitization of the staff on safety and environmental issues;
- initiation of HIV/AIDS sensitization campaign;

Construction phase

- implementation of all mitigation measures as stated in previous sections;
- implementation of HIV/AIDs sensitization campaign;
- Occupational health and safety measures (conditions at materials storage places, borrow sites, equipment, personal protective equipment (PPE), etc,).
- Conditions at workmen's camps (accommodation, sanitation facilities, hygiene, water availability etc,).
- Collection and analysis of baseline data on air and water quality, noise levels and socio-economic aspects.

Busega District Environmental Officer will be responsible for monitoring environmental impacts after construction of the Mwamkala Charco Dam. Busega District Community Development Officer and District Aids Control Coordinator will be equally involved in monitoring the trend in socio-economic status and HIV/AIDs pattern respectively.

Therefore, among other issues, the District Environmental Officers, District Community Development Officer and District Aids Control Coordinator, should deal with,

- monitoring water pollution from various pollutants from construction equipment such as oil spills;

- Soil erosion and degradation control measures during construction;
- Water quality monitoring;
- changes in socio-economic status;
- HIV/AIDs trends

10.2 Reporting Arrangements

The contractors' appointees to deal with Environmental Management will cooperate with District Environmental Officers and other sectoral officers in Busega District to provide the Regional Environment Office with environmental reports of the project implementation as part of the progress reports and annual environmental monitoring reports. The Regional Environment Office will be the link between the project and the National Environment Management Council and the Department of Environment under Vice President's Office.

Since the proposed project involves the construction and operation of the Charco Dam, the project proponent, has developed a thorough understanding of the scope of potential environmental impacts of the Charco Dam project, and will set effective monitoring strategies matching those which are used in other exiting Charco Dams.

The table below presents the preliminary costs for implementing an Environmental and Social Monitoring plan. The plan outlines the parameters that will require monitoring during construction and later operation of the Charco Dam, indicators for monitoring, assigns responsibilities and states the means and frequency of monitoring. The costs estimated for monitoring activities is also presented.

Table 12: Environmental and Social Monitoring Plan

Parameter to be Monitored	Sampling Area	Management Method	Target Level	Responsible Organ	Time Frame	Estimated Costs (TZS) Remarks
Preconstruction Phase						
Vegetation clearance	Access road and Charco Dam site	Vegetation clearance plans are according to necessary requirements	Vegetation loss limited to areas for permanent structures	District Natural Resources Officer/DEMO	Once during vegetation clearance for access road and dam site	200,000
Solid and trash wastes generation in demolition works	Households and access roads	Wastes collected and disposed off in appropriate places	Wastes disposed safely	District Health Officer/ District Environment Officer	Once before start of construction	200,000
Land loss and fauna disturbance	Dam site and access roads	According to plan. Ensure reinstatement.	Land loss limit according to engineering design	District Natural resources or Forestry officer/ District Land	Once during site preparation	200,000

				Officer (DLO)		
Construction Phase						
Land loss	Land owners	Compensation is done	No claim on land acquisition	Busega District Council	Once before commencement of the project works	450,000
Water/Soil Contamination	At car washings, parking, nearby water sources, construction sites	Water and soil not contaminated e.g. with oils	Hydrocarbons in water (as total organic carbon) Not to exceed 10 mg/l by APHA Standard Methods 5520	District Water Engineer/ DEMO	Twice during construction phase	200,000
Poor air quality from Charco Dam and road construction works	Dam site and access roads	Control measures are in place	Emissions of CO, SOx, NOx, PM10 and Dust to meet the requirements of TZS 845:2005 Air Quality – Specifications	District Engineer /OSHA District Office)	Twice- when equipments are mobilized and weekly routine after start of construction	300,000
Solid and trash wastes generation	Dam site, households and access roads	Wastes collected and disposed off in appropriate places	Wastes Transported and disposed safely	District Health Officer/ District Environment Officer	Weekly during construction phase	200,000
Influence on Community Life style	Construction sites	Check if there are any complaints and mitigation measures are in place	Social conflicts	Community Development Officer	Once during construction and operation phase	200,000
Health and Safety	Dam site, and access roads	Use of PPE at work place and communities are sensitized	PPE used properly, Accident target level to be zero	District Health Officer/ OSHA district Office	Once before works start and monthly during construction	200,000
Noise pollution during civil work construction	Dam site, and access roads	Equipment maintained	Noise and Vibration (<60 dBA at day and < 50 dBA at night	District Health Officer/ OSHA district	Twice- when equipments are mobilized and weekly routine after start of	200,000

				Office	construction	
Soil pollution during civil work construction	Dam site, and access roads	Measures are put in place	No soil contamination	District Natural Resources Officer/ DLO	Monthly during construction.	200,000
Operation Phase						
Increase in Water related diseases	Domestic Tap point and trough	Community sensitized on handling water for domestic purposes and sleeping into mosquito nets	Infection cases	District Health Officer	Monthly during operation phase	250,000
Water/Soil Contaminatio n	Domestic tap point or trough, canal, access road	Water not contaminate d with oils, pesticides, fertilizers, faecal matter	Hydrocarbons in water (as total organic carbon) Not to exceed 10 mg/ l by APHA Standard Methods 5520	District Water Engineer/ DEMO	Twice a year during operation	200,000
Risky to life	Mwamkala villagers	Well fenced dam to restrict entrance from children and animals	Accident level targeted to be zero	District Irrigation Officer/ Engineer	Monthly during Charco Dam construction and operation.	250,000
Increased crime and social conflict	Mwamkala villagers	Communitie s sensitized.	No offences reported.	Community Development officer	Once during mobilization, construction and operation phases	200,000
Soil erosion and dam Sedimentation	Livestock routes, nurseries, canal and access road	Soil erosion control measures are put in place, Afforestatio n of the catchment area	Siltation occurred in the dam	District Irrigation Officer/DE MO	Twice a year and after every heavy rain	400,000
Soil salinity	At Nurseries, access roads	Salts are limited in a designated area with effective leaching mechanisms	Salinity in soil/ground water or surface water is within standards depending on the uses	DIO/DEM O	Twice during construction phase and twice per year during operation phase	200,000

Water user & Land Conflicts	At troughs, domestic tap point, nurseries, access roads	Communities sensitized on sustainable resources utilization	No conflicts	Village government/ district Land Officer/ DIO	Twice per year during operation phase	200,000
Dam Breach	Dam embankment	No damaged properties downstream of the embankment	Proper dam functioning	District Irrigation Officer / Engineer	Monthly during construction and operation phases	250,000
Total Estimated Monitoring Costs						**4,300,000**

11. Summary and Conclusion

The Preliminary Environmental Assessment (PEA) for Mwamkala Charco Dam has been completed by describing the project characteristics and identifying and evaluating the impacts. The project beneficiaries are looking forward to the decision to be made by NEMC. If NEMC is satisfied that the Charco Dam project shall not have significant negative impacts on the environment and the community, or that the information provided in PEA report discloses sufficient mitigation measures, it may proceed to recommend to the Minister to approve the project so that subsequent project activities may continue.

In identification of the environmental and social studies, the consultants carried out field surveys to collect the environmental and social information and also discussed with the local authorities concerning the environmental and social impacts of the Charco Dam project. They proposed mitigation measures which were incorporated in this PEA report. The consultants also carried out consultation meeting with the local communities around the project area to integrate their requirements in the project.

This project is essential for the residents of Mwamkala as they expect to benefit in the fields of livestock keeping, micro irrigation, water for domestic purposes and other uses of water for daily life.

The aim of the project is to provide water for community domestic use, water for small scale irrigation and water for livestock drinking. In view of the above requirement, it should be noted that during site assessment, the investigation on project site/location alternatives was limited to the earmarked existing location specifically based on land allocation and ownership according to the village land use plan.

Most of the project negative impacts can be mitigated with appropriate measures. The community will have to ensure that all areas likely to be eroded are protected effectively, as well; they have to ensure that the faecal matter is collected in the toilets.

The project is estimated to cost a sum of Tanzania Shillings Fifty Nine Million and Nine Hundred and Twenty Thousand and Six Hundred and Sixty Three (TZS 59,920,663).

The local communities should be more involved during dam project development works for example through formation of the Water User Committee order to increase sustainability of development initiatives. This will certainly enhance ownership through instilling a greater sense of ownership by the community, who are then more likely to engage in the active maintenance of the dam, reservoir and catchment area.

Busega district council have to make arrangements and efforts at identifying investment potentials to the community such as fishing, sustainable use of forestry products and bee-keeping with capability to increase sustainable resources use. Agricultural empowerment given to the community will also be related to use of new technology and establishment of market facilities, knowledge of food processing and preservation, promoting irrigation and use of modern agriculture equipment and inputs,

Other important issues which the community have to be educated include establishment of credit facilities such as Savings and Credit Co-operative Societies (SACCOS), to enhance natural resources conservation e.g. resources along Simiyu River and the participation of the Community towards preserving them.

Proper health care and education which includes health facilities and services, improved livestock infrastructures such as cattle dips, abattoirs, hide processing, livestock markets, veterinary centres and cattle troughs are pillars for sustainable livestock development most of these infrastructures in the district and in the village are not adequate and some are not available.

For sustainability of the Charco Dam, normally the buffer zone is established, thus the Urban Planner from Busega district council will develop maps which will show the buffer zones as early as possible before completion of construction works.

Experts from Busega district council will have to provide HIV/AIDS education to Mwamkala villagers so that it can make people change their behaviour in sexual relations.

Reference

1. Socio-Economic Profile for Magu District Council, 2011
2. URT: 2002 Population and Housing Census- General Report January, 2003
3. URT: MKUKUTA- Annual implementation Report, 2009/2010 November, 2010
4. URT: National Environmental Action Plan, NEAP (1994)
5. URT: The National Environmental Policy, NEP (1997)
6. URT: The National Land Policy (1996)
7. URT: National Water Policy (2002)
8. URT: The National Irrigation Policy (2010)
9. URT: The Agricultural and Livestock Policy (1997)
10. URT: Wildlife policy of Tanzania (2007)
11. URT: The National Policy on HIV/AIDs (2001)
12. URT: The National Employment Policy (1997)
13. URT: Women and Gender Development Policy (2000)
14. URT: The Environmental Management Act (EMA), Cap 191 (No. 20 of 2004)
15. URT: Environmental Impact Assessment and Audit Regulation of 2005
16. URT: Land Act Cap 113, (No. 4 of 1999)
17. URT: The Land (Forms) Regulation 2001
18. URT: The Village Land Act, Cap 114 (No. 5 of 1999)
19. URT: The Land Acquisition Act, Cap 118 of 2002
20. URT: Land Use Planning Act No. 6 of 2007
21. URT: Forest Act No. 14 of 2002
22. URT: Wildlife Conservation Act, No. 5 of 2009
23. URT: The Mining Act No. 5 of 1998
24. URT: The Water Resources Management Act No. 11 of 2009
25. URT: Water Supply and Sanitation Act No. 12 of 2009
26. URT: The Engineers Registration Act No. 15 of 1997
27. URT: The Contractors Registration Act No. 17 of 1997
28. URT: The Occupational Health and Safety Act No. 5 of 2003
29. URT: The Surface and Marine Transport Regulatory Authority Act No. 9 of 2001
30. URT: The Roads Act No. 13 of 2007
31. URT: Local Government (District) Authorities Act No. 7 of 1982

Appendices

Appendix 1: Copy of the letter for Screening Decision

NATIONAL ENVIRONMENT MANAGEMENT COUNCIL (NEMC)

BARAZA LA TAIFA LA HIFADHI NA USIMAMIZI WA MAZINGIRA

Tel Dir.: +255 22 277 4852
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Mobile: +255 713 - 608930
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Regent Estate / Migombani
Plot No 29 / 30
P.O.Box 63154
Dar es Salaam
Tanzania

In reply please quote:
Ref: **NEMC/512/1/Vol. 11/50**

Date: **27/07/2012**

Permanent Secretary,
Ministry of Water,
P.O. Box 9153,
Dar-es-Salaam.

Att: Eng. Anna Mdamo

RE: SCREENING DECISION FOR CONSTRUCTION OF PROPOSED MWAMKALA CHARCO DAM, MAGU DISTRICT IN MWANZA REGION

The above subject matter refers.

We acknowledge receipt of your consultant's letter Ref EBM/LVEMP 11-2012/282 of 20th July 2012 attached with three copies of registration forms, five copies of Project Brief and copy of receipt of payment of registration fee for the above mentioned undertaking. We have reviewed the documents and found that the information provided is adequate to guide the environmental assessment. In this regard, you are advised to prepare Preliminary Environmental Assessment report for this undertaking. However, the PEA report should provide but not limited to the following information:

1. Water trough which will be constructed to provide water for livestock, the designs for the surrounding environment for the water troughs should take note of how soil erosion will be taken care as when many livestock come at one point; if the surrounding environment will not properly be constructed; serious soil erosion is likely to occur.

2. The charco dam will be multipurpose one eg for livestock, small scale irrigation and domestic use. Its volume capacity should clearly be indicated in the PEA report and how many people will be served by the dam.

3. The management of catchment surrounding areas should be clear to the Magu District Council and the local communities.

4. The engineering designs for the dam should allow easy accessibility of people when drawing water.

All correspondence should be addressed to the Director - General

In addition, the experts required to be in the team during PEA study we recommend the following but not least experts:

1. Environmental expert
2. Livestock expert
3. Land and Water experts

Be reminded also that, during preparation of PEA report, you are advised to consult EIA and Audit Regulations, 2005 particularly Regulation 11 for format and contents and submit fifteen copies of PEA report to the Council for review and approval.
Please note that you will be required to meet the review cost the budget of which will be sent to you after you have submitted final PEA report to the Council.

We look forward to your cooperation on this matter.

K.C.Sengoe
For: Director General

Ce √ Eng. Venant E.K.Rwenyagira,
Environmental Benchmark,
P.O. Box 77222,
Dar-es-Salaam.

Appendix 2: Officials consulted in Magu district

NA	TAREHE	JINA	CHEO ~~MTAA~~	SAHIHI
1	25.6.2012	Jacqueline Liang	DC	
2.	25.6.2012	THOMAS P NYABASI	DAS-MAGU	
3	25/6/2012	OMARY JUMA	—	
4	25/6/2012	Yared Mgula	DPLO	
5	25/6/2012	LUBAPULA MAYUMBYA	DFPO	
6	25/6/2012	JUMANNE L. MANGARA	DEMO	
6.	25/6/2012	FORTUNATA MGANGA	THO	
7	26/6/2012	Joseph M. Magai	CDO	

Appendix 3: Attendance to consultation meeting

MKUTANO NA WANANCHI WA MWAMKALA JUU YA UJENZI WA BWAWA LA MWAMKALA 26/06/2012

MAHUDHURIO

NA	TAREHE	JINA	MTAA	SAHIHI
1.	26/6/2012	MARCO L. NGANGA	MWAMKALA	A. Nganga
2.		MUSA WILSON KADINDA	MWAMKALA	M. Kadinda
3.		ELIAS MALONGO	MWAMKALA	[illegible]
4		Kija Robert	—	Kija
5		[illegible]	—	[illegible]
6.		Roza Joseph	—	Ro
7.		AGINES JOSEPH	—	AGINES
8.		Thabitha Nturgu	—	Tabitha
9.		Jeremia Enos	—	Jeremia
10.		Eliza Salamani	—	Eliza
11.		Maria Hamis	—	Maria
12.		Ester Lubeni	—	Ester
13.		Sotto Kisiosa	—	Sotto
14.		Pili Sahani	—	Pili
15.		Ntuji Malilike	—	Ntuji
16.		Bakele - Joseph	—	B. Joseph
17		JACOB S. NIEMINYANDA	11	Nieminyanda
		AFISA MTENDAJI KIJIJI CHA MWAMKALA MAGU		

Appendix 4: Minutes of Consultation Meeting

MHTASARI WA MKUTANO WA WADAU WA UJENZI WA LAMBO – MWAMKALA TAR 26/06/2012:

M/kiti wa kijiji Ndg Marco-Nganga alifungua kikao mda wa Saa 6:45 Asb kwa kuwashukuru wananchi waliohudhuria mkutano. na baada ya kumaliza kufungua mkutano huo wageni waliokuwa wamefika walianza kujitambulisha. Baada ya hapo Mhandisi kutoka environmental Benchmark alianza kutoa ufafanuzi kuhusiana na Mradi ujenzi wa Lambo na hatimaye aliwaomba wananchi kutoa hoja zao za msingi kuhusiana na ujenzi wa Lambo, na kabla ya kuanza kuchangia aliwauliza wananchi swala la kwa kama wanaupenda mradi huo wa Lambo, Jibu kutoka kwa wananchi walijibu kuwa mradi wanaupenda. pia Mwananchi mmoja alichangia hoja yake kwa wageni kuwa wanaomba Lambo Lichimbwe, Lenye kina kirefu, Pia na hata tuta Liwe imara, pia Mhandisi kutoka environmental Benchmark alisisitiza kuwepo na kamati ya kusimamia hilo Lambo. pia wananchi walihoji kuhusu kuwa Mradi huo utaanza lini? Jibu kutoka kwa Mtaalamu alijibu kuwa Mradi huu haujulikani kuwa utaanza lini kwani kuna michakato bado inafanyika pia Mtaalamu kutoka environmental Benchmark alihoji, kuwa ni kaya ngapi zina vyoo? Jibu 50% ya idadi ya kaya zote za kijiji cha Mwamkala hazina choo, baada ya majibu

Mtaalamu aliendelea kusisitiza suala la usafi na kushauri kila kaya ichimbe choo na kukitumia. Pia Mtaalamu alisisitiza suala la kuchemsha maji.
Mhandisi wa maji kutoka (W) ya Magu alisisitiza kuwepo na mfuko kwa ajili ya kuliendeleza hilo Lambo kwa mfano ~~A~~: pindi linapoharibika serikali haitaleta na msaada tena isipokuwa jamii yenye mradi husika ndiyo itawajibika.
Kikao kiliahirishwa muda wa saa 7:30 Mchana.

AFISA MTENDAJI
KI[illegible] CHA MWAMKALA
MAGU

Appendix 5: TAC Comments – Response Table on PEA for Busega Charco Dam

S/N	ITEM	ACTION
1.0	**GENERAL COMMENTS**	
i.	The indicated cross section of the Charco dam is zoned but the one which is under construction is homogenous. See top cover of the PEA report. Include specific cross section of the dam.	The drawings for the project are the ones included in the report. What is happening at the site might be wrong not following what the drawings indicate. This will be checked by the Supervising Engineers at site. Therefore the cross section indicated under section 2.4 (Figure 5) is a specific cross section of the proposed charco dam.
ii.	The executive summary should be short, which provides in brief the major findings and conclusion. Avoid summarizing every section and remove the matrices from the executive summary.	Summarized and it is according to regulation 18 (3) (d)
iii.	The term Charco has been repeatedly written in lower case, since this is a name it should start with capital letter.	Punctuation (capitalization of the first letter of the project name) effected.
iv.	The document should be reorganized; there should be space between paragraphs to separate them.	Spaces between paragraphs provided as required.
v.	Some abbreviations are missing in the list.	All abbreviations included.
vi.	The report show that there is a gap in expertise coverage, the biologist is missing, this has resulted to misinterpretation of terminologies.	The screening decision did not require of the Biologist in the EIA team.
vii.	Page numbering should be revised, start with Roman Numbers, then from introduction start with Arabic numbers.	Renumbering effected.
viii.	The report does not tell how much land will be needed by the project.	It is stated, 3 hectares under Section 2.4.
ix.	The intake pipe and the cattle trough were not set although the construction has reached 45% of total work. The intake and cattle trough need to be placed before construction of the dam is completed.	This is the work of the Supervising Engineer and since he will have a copy of the report, the anomaly will be

		corrected at site not in this report
x.	There is no soil information in the PEA report to indicate the suitability of the soil for the dam construction.	Comment noted and the designer has been informed of the anomaly
xi.	The construction of the dam is proceeding without watering to the required moisture content before compaction.	This is the work of the Supervising Engineer and will take note of the recommendation during construction
xii.	The PEA report is missing an attachment of the design report which is important for the technical review.	The summary for preliminary design is presented on section 2.4.
2.0	**SPECIFIC COMMENTS:**	
i.	On the cover page the e-mail address should be secgtretarydg@nemc.or.tz and dg@nemc.or.tz	Noted and changed on the cover page
ii.	Page 2, the list of experts should have name, specialty and signature, others should be additional.	Done as per this requirement.
iii.	Page 2, the signature for Eng. Sanjo Mgeta is missing.	Signed.
iv.	Page 5 the list of tables should be on the new page.	Done.
v.	Page 9, sect, 5 the 1st sentence, delete the second word to the work "which" replace with "stakeholders consultation"	Replaced.
vi.	Page 14 section 8 the 1st sentence replace the word investigation with "assessment"	Replaced.
vii.	Page 15, sect 10, the 2nd and 4th para, these are proponent's responsibilities the reports are then to be submitted to NEMC.	Revised.
viii.	Page 15, sect, 11 the title should be summary and conclusion. Therefore, the content should be revised to reflect the title.	Revised as per this requirement.
ix.	Page 17, the acknowledgement should be written by the proponent since is the one who own the document.	Done as per requirement.
x.	Page 19, the 1st para should say what the largest lake is.	Stated as Lake Victoria.

xi.	Page 22 sect. 1.4.2 water for domestic requirement, the estimated amount of water use per day per person (20 litres is very little.	It is according to the research conducted on existing situation.
xii.	Page 24 the report does not tell how much water will be deviated per unit time to the dam.	The charco dam is not meant for diverting any river it will only be collecting the runoff from rainfall.
xiii.	Page 50, Sect iv the second para the last sentence, where are the 40 BMUs located? Is it in Magu district, Mwanza region or national wide?	40 BMUs standards for 40 nos. Beach Management Units. It is for Magu district.
xiv.	Page 53, section 4.3 the second para the 1st sentence the consultants are missing biological knowledge leading to misleading information.	Revised.
xv.	Page 54, sect 5.1 the heading should be Stakeholder Consultation and should show how stakeholder's consultation was done and how the public was involved in section 5.2.	Revised.
xvi.	Page 62 the numbering should be revised at the Soil *erosion.*	Revised through removal of auto numbering
xvii.	Page 76, should insert the column of impacts before parameter the whole table 11 needs to be redone.	The impacts are many as shown under chapter 6 from which the mitigation targets were extracted. The impacts, cannot be repeated in subsequent sections that is why the mitigation target level was used instead of mitigations
xviii.	Page 80, should start with the column indicating impacts, then parameters, then column with management methods should be rephrased to become activity under this plan. The column with responsible organ should be the proponent. However, this matrix needs to be redone.	As above, this will be a sheer repetition of impacts which does not add value to the report rather than making a report voluminous for nothing as impacts are already presented under Chapter 6
xix.	Page 83, the title under section 11 should read summary and conclusion and the content below it should follow the title.	Title corrected.
xx.	Page 8, provide information about the size of the road to be constructed and to which standard?	The road will be of murram/gravel standard 6.5m in width stated under section 2. Project Description
xxi.	Indicate on page 8, para 2 types of crops to be cultivated during the project operation and the size of the farms to be under cultivation and amount of water to be used for irrigation.	Indicated.

xxii.	The estimated storage capacity of 202,500m^3 as indicated in the PEA report does not reflect the real situation to the dam storage on page 8.	Designers informed of the anomaly and are making corrections in design.
xxiii.	Indicate on page 11, section (i) who are to be compensated?	Stated.
xxiv.	On page 19, provide coordinates, scale bar, north arrow on the provided map figure 1	All map essentials are indicated on figure 1.
xxv.	The dam embankment is vise verse to the drawn contour lines and does not retain water. However, at construction site the dam embankment is set according to the contour lines and can retain water on page 28.	Designer is informed of the anomaly. This PEA does not include design of the charco dam as erroneously thought by some TAC members!
xxvi.	The proposed spillway length should be extended far from the dam embankment to reduce risk of eroding the wall. See page 28.	Detailed design will incorporate the observation
xxvii.	The spillway width is not indicated in the drawn longitudinal section (page 29) and it is not a cross section as indicated.	Design engineer informed of the anomaly
xviii.	The provided figure 3, on page 26 lacks scale bar, coordinates, legend and north arrow.	These figures are used for indication purposes and they are not meant to be sufficient on their own. The actual drawings of the charco dam are there and in larger scales. They can be presented as separate documents on demand.
xxix.	Provide information on page 27, para 1 types of fish to be introduced in the Charco dam.	Stated Tilapia and picture shown.
xxx.	On page 48, section 4.2.2 it is stated that land acquisition is at final stage. Indicate if all issues related to land acquisition has been completed.	The project originated from the village and the village is responsible for settling all issues associated with land ownership.
xxxi.	Indicate in the report if there is a need of landuse change from farms to Charco dam use.	The village has no land use plan prepared yet and therefore the present proposal will be indicated in the land use plan to be prepared later.
xxxii.	On page 48, section 4.2.2 the size of land set for the project is not provided.	Stated as 3 ha under the same section 4.2.2.

xxiii.	On page 56, it is stated that land for the project was in the past used by school for self reliance on bullet (iii). Indicate in the report if the school was managing the land legally or illegally? **Not that the school was not consulted to provide their comments about the project and their land.**	Please note that the project originated from the village. The village has the mandate to allocate land for school and all other activities within the village. The school is not an independent entity in the village such that it has its own separate mandate. Please note for records that the school also needs water.
xxiv.	On page 63, bullet iii and bullet 1 a detailed engineering design is not attached in the PEA report.	Following these comments the designers was informed of the requirements and the drawings will be ready before the project is implemented.
xxxv.	Indicate on page 64 how to ensure that the supplied water does not exceed the required limit?	Soil scientists to be consulted.
xxvi.	Indicate on page 53, types of common plant species found in the area on section 4.3.	Indicated under section 4.3
xxvii.	On page 55, it is indicated that 55 percent of communities living close to the project site has no toilets and therefore they might pollute the charo dam. This need an urgent action by involving the Village council and communities before operation of the dam.	Since the report will be sent to the village, immediate actions will be taken by the village and the project proponent will monitor this
xviii.	Page 56, bullet 1 a problem of increased water born diseases in the village was raised by stakeholder due to faeses. This needs an urgent measure.	The concern was raised during the stakeholders meeting. Hopefully it will be given the attention it deserves from the project proponent
xxix.	Page 10, section iv indicate when will communities living in the surrounding construct toilets to avoid polluting the Charco dam?	Capacity building will involve educating the community to construct the toilets, themselves.
xl.	Mitigation measures for flood needs to be known by all communities so that they take action together.	Villagers will form Water User Committee which will organize implementation of provided mitigation measures during operation.

xli.	Indicate in the report if the water limits exceed the needed limit what will happen and how to mitigate the problem immediately.	It has been indicated that it is water logging and the gates will be provided to control excess water entering the irrigated land.
xlii.	Indicate in the report source of crocodile in the Charco dam on page 64 section. 6.3. (this might risk human life).	Flooding may allow migration of the reptiles since these organisms are not static; they are moving while looking for "green pastures".
xliii.	The need of each community living close to the Charco dam to have own toilet and use it effectively is very important to avoid pollution in the Charco dam.	Noted, and part of the community sensitization and capacity building.