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Mwabuma Village Council

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Meatu, Simiyu

Preliminary Environmental Assessment for the Proposed Construction of Charco Dam at Mwabuma Village in Meatu District in Simiyu Region

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Preliminary Environmental Assessment for Proposed Construction of Charco Dam at Mwabuma Village in Meatu District in Simiyu Region

Declaration

This Preliminary Environmental Assessment report has been prepared by;

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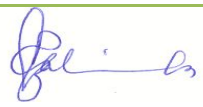
Eng. Patrick C. Valimba – Undertaking assessment of impacts related to water resources	Water Resource Engineer	

Table of Contents

List of Tables

List of Figures

Executive Summary

1. Introduction

Lake Victoria is the second largest freshwater lake in the world, with a surface area of about 68,000km^2, shared in the proportions of (6%), (43%), (51%) by Kenya, Uganda and Tanzania respectively. The catchment area of the lake is about 197,500km^2, which extends into the republics of Rwanda and Burundi as well, with an estimated population of more than 30 million people living within the basin.

Lake Victoria 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. The Lake is also a major reservoir and source of water for domestic, industrial, hydropower production and commercial purposes. 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.

As part of many initiatives by East Africa Community Partner States to control further deterioration of the lake, some environmental management activities dubbed "LVEMP-I", were planned and implemented. The LVEMP I ended in December 2005 followed by the second phase (LVEMP II) in 2009, which has an implementation period of eight (8) years (2009-2013 and 2014-2017).

Among the areas focused by LVEMP-II is Mwabuma village in Meatu District which has a number of environmental problems including soil erosion; gullies caused by livestock routes and human activities such as washing, bathing and horticultural and livestock activities in Simiyu River catchment. The village prioritized Charco Dam construction as one of the strategy to reduce environmental degradation through reduction of livestock concentration and human activities at Simiyu River.

The number of livestock expected to benefit from the project is about 2,850 from six sub villages. It is expected that through this proposed sub project, there will be a significant reduction of soil degradation and also horticultural activities along the river will be equally reduced.

In order to facilitate construction of the proposed Charco Dam, the Ministry of Water through LVEMP II commissioned M/s Environmental BENCHMARK, Consulting Civil-Environmental Engineers of Dar es Salaam, to carry out an environmental and social impacts assessment for the proposed Mwabuma Charco 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 reviewed the project brief and the EIA forms and 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.

2. Project Description

The proposed Charco Dam is envisaged to be constructed at Mwabuma Village, Mwabuma ward in Meatu district, in a newly formed region of Simiyu. The village is located in North Eastern side of Meatu district headquarters. The district's total area is 8,835 Square Kilometres. Meatu is one of the 5 districts of the new Simiyu region. Others are Bariadi,

Itirima, Busega and Maswa. Accessibility to the sub project site is mainly by the Mwanhuzi to Mwabuma road through Mwakaluba village about 90km.

The preliminary design suggests that the Mwabuma Charco Dam will be composed of an area for livestock feeding (cattle trough), irrigation of small horticultural activities, water for domestic use and aquaculture. The dam will store water about 20,000 m^3 from the seasonal stream by constructing the inlet and canal into the Charco Dam.

3. Policy, Administrative and Legal Frameworks

Relevant legislations pertaining to development of Mwabuma Charco Dam project mainly 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. It is important to note that the project is also funded by the World Bank, which has keen interest in protection of the environment; therefore the project has to be in line with its safeguards policies. Under this section, an analysis of different policies, administrative and legal frameworks and relevant international treaties and conventions and safeguard policies of the World Bank as they apply to this project were discussed.

4. Baseline Conditions

The most predominant soil type is clay loam soil which is somewhat like black cotton soil. 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 rainfall pattern is unmoral with one rainy season from November to May. The southern part of a district receives a mean annual rainfall of 400mm while the northern part receives up to 900mm per year. The average annual rainfall amounts to about 800 mm to 1000 mm per annum. Its distribution is unreliable with an implication that irrigation is highly required for these area and similar areas. The mean monthly temperature in the areas is 22^oC.

The findings on Flora especially on threatened/endangered/endemic species discovered that no potential species will be endangered. The findings on Fauna, the study also revealed that no threatened/endangered/endemic potential species will be endangered. Overall the Charco Dam development falls within an area that is not protected from human activities and therefore no special ecological feature was taken due to the diversity of activities such as grazing and cultivation carried out in the catchment.

The Socio-Cultural Environment

Mwabuma village has a total population of 5,878 of which 2,703 are men and 3,175 are women with a total number of 840 households. The village also has 2,340 cattle, 489 goats and 189 sheep. The main activities in the village are livestock keeping and cultivation of crops. The neighbouring land is occupied by individual plots for sweet potatoes, maize, cotton and sesame.

The districts major economic undertakings include farming and animal husbandry. Other sectors are small scale industries and trading. Cotton is the leading cash crop, while maize, cassava, groundnuts, vegetables, millet and sunflower follows.

Provision of Socio Services

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

Common Water-borne Diseases

The district is characterized by high death toll resulting from common preventable diseases such as malaria, typhoid, dysentery, skin infection, worms and bilharzias. These diseases contributed high morbidity to majority of people in the district in 2011. In this case Mwabuma village is not an exception and construction of charco-dam should consider preventive measures to reduce the diseases related to inadequate clean and safe water.

Water and Sanitation Sector

In response to the requirements of the National Water Policy 2002, surface water improvement in the district has been carried out by construction of Chaco-dams, shallow wells sources, Borehole, rain water tanks in different areas of the district.
Mwabuma ward communities have no community piped water supply; they depend on underground water resources. Simiyu River is the main surface water resources in the area. Shallow wells and local shallow wells are common in the area.

Hygiene behaviour has a critical influence on the transmission of disease. This is particularly true in situations where disease risks are acute due to poor hygiene practices, unsafe water and sanitation. The most common is the incidence of diarrhoeal diseases which constantly affect the study area.
Construction and use of latrines in the study area may pose a threat to health since people tend to ignore the need to construct good toilets compared to the main houses. At Mwabuma village 57% of the households have poor quality toilets due to ignorance and the habit of not valuing toilets. Despite the frequent occurrence of epidemic diseases in the study area like typhoid, amoeba, dysentery and cholera according to the study data 43 % of the entire population in all villages do not use latrines instead they 'relieve themselves in the bushes and Simiyu River while taking bath.

5. Stakeholders' consultation and Public Involvement

Stakeholders' consultation and the public were consulted and they all accepted the project and generally insisted for the project to start construction as early as possible before the rain season and that the Charco Dam should be strong enough to ensure sustainability.

Among the requirements of the villagers is the addition of more similar projects to at least three Charco Dams in order that the villagers from different localities can access the water and there should be the toilet near the Charco Dam so that those who will be working close to the Charco Dam can use it.

6. Identification of Impacts and Corresponding Mitigation Measures

Positive impacts of the proposed project include;

1. Reliable supply of water for livestock
2. Reliable supply of water for domestic purpose

3. Reliable supply of irrigation water
4. Increased production of crops
5. Increased income, poverty alleviation and food security
6. Opportunities for temporary employment
7. Creation of new businesses opportunities at the construction site

Negative Impacts of the project

Mobilization Phase

i. Loss of natural aesthetic value
ii. Generation of solid waste

Construction Phase

i. Land scarring from cut and fill of construction materials
ii. Soil erosion
iii. Soil pollution during civil work construction
iv. Dust and air pollution during civil work construction
v. Noise pollution during civil work construction
vi. Contamination of water such as from leakages of fuels and lubricants from the construction equipments, fertilizers and poor hygiene
vii. Child labour
viii. Disturbance to people going to draw water at the borehole located near the proposed area

Operation Phase

i. Increase in water related diseases
ii. Soil erosion
iii. Soil Salinity
iv. Dam Breach (uncontrolled flooding)
v. Water Logging
vi. Water contamination

Economic and Socio-Cultural Impacts to Local Community

i. Influence on community life style
ii. Increased crime and social conflict
iii. Water user and land conflicts

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;
- Alterations in predator-prey relationships.

8. Project Alternatives

The EIA procedure requires that an environmental investigation identify main project alternatives for any proposed development. In principle, these alternatives 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.

On assessment of the project locations, several options were analysed. However, it should be noted that during site investigation, the investigation on project site/location alternatives was limited to the earmarked existing location basing on land allocation and ownership according to the village land use plan.

9. Environmental and Social Management Plan

In Tanzania the Environmental Assessment framework is guided by the 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. 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.

Implementation Arrangement of the EMP

The project proponent is the Ministry of Water who will be assisted by the Designers and Supervisors from Meatu District Council. To minimize potential environmental and social negative impacts, the project will require the support of various institutions in the project area. The actions of the EMP of the have been outlined under table 13 in the main report. The organizational framework for the EMP is designed to evolve as the project progresses through pre-construction, construction and operation phases.

On reporting arrangements, the contractors' appointees to deal with Environmental Management will cooperate with District Environmental Management Officer and other sectoral officers in Meatu 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.

10. Environmental and Social Monitoring Plan

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. The 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. The budget of monitoring amounting to TZS 3,850,000 has been estimated

11. Summary and Conclusion

The project beneficiaries are waiting for decision from 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 and they proposed mitigation measures which were incorporated in this PEA report. The consultants also carried out consultation with the local communities around the project area to integrate their requirements in the project.

This project is essential for the residents of Mwabuma ward as they expect to benefit in the fields of livestock keeping, aquaculture, irrigation in small scale horticultural activities, water for domestic purposes and other uses of water for daily life.

Most of the project negative impacts can be mitigated with appropriate measures. Constant involvement of LVEMP II, the Contractor and Meatu district authorities, as well as village government authorities and the local communities in the project area will be required to implement and monitor the mitigation measures. Among the significant environmental impacts that will result from the Charco Dam project operation is soil erosion. Soil erosion will result from congestion of livestock at the troughs, drinking area and along their routes to the dam. In order to avoid contamination of water in the Charco Dam during operation phase, the toilet will be constructed at the project site in order that those who will be working at the area can use it.

Mwabuma Charco Dam construction is estimated to cost about Sixty Four Million Tanzania Shillings. This is a lot of money and in order to ensure its effective utilization as it was intended, the supervising experts from Meatu district council and LVEMP II will be making close follow up especially during construction to ensure quality of construction works.

Acknowledgements

A number 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 consultants and their assistants such as the sociologist Ms. Haikael Mfangavo, assistant environmental assessment expert, GEng. Weisiko Magoto and the assessment team driver, Mr. Ladslaus Kamugisha.

The LVEMP II as well is grateful to Meatu district authorities including Mr. Rogatevane Kipigapasi (Meatu District Economist) and Mwabuma village authorities for their support during the assessment.

The LVEMP II is also greatly indebted to the villagers of Mwabuma for their time to participate in public consultation process and provide immeasurable input into the assessment 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
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
GET	Global Environmental Facility
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome
I&APS	Interested and Affected Parties
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
NEMC	National Environment Management Council
NGO	Non-Governmental Organization
PEA	Preliminary Environmental Assessment
RPCT	Regional Project Coordination Team
SACCOS	Savings and Credit Co operative Society
SIDA	Swedish International Development Agency
TOR	Terms of Reference
WDC	Ward Development Council

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 the lake is shared in the proportions of (6%), (43%), (51%) by Kenya, Uganda and Tanzania respectively. The catchment area of the lake is about 197,500km^2, which extends into the republics of Rwanda and Burundi as well with an estimated population of more than 30 million people living within the basin.

The coverage of Lake Victoria basin is as indicated in Figure 1 below. Lake Victoria 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. The Lake is also a major reservoir and source of water for domestic, industrial, hydropower production and commercial purposes. Furthermore the Lake acts as 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.

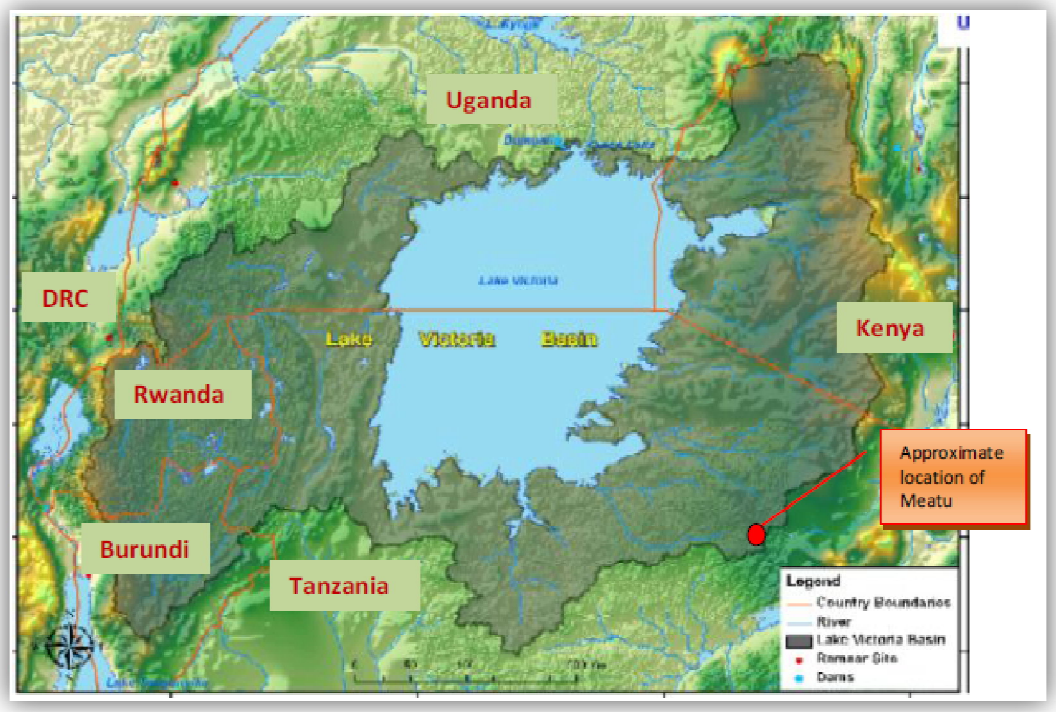


Figure 1: Lake Victoria Basin showing the approximate location of Meatu

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.

As part of many initiatives by East Africa Community Partner States to control further deterioration of the Lake, Lake Victoria Environmental Management Project (LVEMP I) activities were planned and implemented in Lake Victoria Basin. The LVEMP I 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).

The LVEMP II is regionally coordinated by the Lake Victoria Basin Commission (LVBC) through its Regional Project Coordination Team (RPCT) based in Kisumu, Kenya. In Tanzania, the project is under the Ministry of Water and became effective on 20th August 2009 and its implementation covers Lake Victoria Basin Tanzania part in the regions of Mara, Mwanza and Kagera, with a total number of 23 districts.

The project is funded by the World Bank, Global Environmental Facility (GEF), Swedish International Development Agency (SIDA), Government of Tanzania and respective communities. Among the areas focused by LVEMP-II is Mwabuma village. Mwabuma village in Meatu district has a number of environmental problems such as soil erosion; gullies caused by livestock routes and human activities such as washing, bathing and horticultural activities in Simiyu River catchment, also drawing water from Simiyu River for livestock and domestic use, aggravate the environmental problems in the area.

Due to environmental degradation and its contribution of pollution to Simiyu River which finally drain polluted water into Lake Victoria, LVEMP II projects focused on Mwabuma village. The village prioritized the sub project of Charco Dam construction as one of the strategy to reduce environmental degradation through reduction of livestock concentration and human activities to Simiyu River. The sub project will provide water to livestock, water for domestic use, tree nursery watering and small scale irrigation about 10 acres of horticulture activities at Mwabuma village.

The number of livestock expected to benefit from the project are about 2,854 from Bulyasulu, Mwanyole, Ng'wang'wina, Ichimu, Mwamulyango and Bukingwamizi sub villages. The Charco Dam will also be used for aquaculture activities. It is expected that through this proposed sub project, there will be a significant reduction of soil degradation and also horticultural activities along the river will be equally reduced. The area to be covered by the Charco Dam site is approximately four (4) acres in Mwabuma village.

Therefore, the overall objective of Charco Dam construction is to contribute to achieve 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 construction of the proposed Charco Dam, an environmental and social impacts assessment for the proposed project was required. To achieve this, the Ministry of Water through LVEMP II commissioned M/s Environmental BENCHMARK, Consulting Civil-Environmental Engineers of Dar es Salaam, to carry out an environmental and social impacts assessment for the proposed Mwabuma Charco 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 reviewed the project brief and the EIA forms and 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 canals
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 Mwabuma Charco Dam construction and its use in order to help NEMC in making decision. If NEMC finds 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 has significant impact on the environment and that the project report discloses no sufficient mitigation measures, it may require the proponent to undertake a full environmental impact assessment.

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

- Improving the understanding of the local communities in identification, assessment or evaluation of the significance of the impacts of the Charco 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 assessment include literature reviews, consultative meetings with district officials, villagers and village leaders and visual observations through familiarization visits in the project area. 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 Mwabuma, district officials and other influential people in the project area.

Public Consultative meetings

Public meetings were held with Mwabuma village members whereby issues related to construction of charco-dam were presented through which the local communities raised their concerns as indicated in the section for public consultation.

Visual observation

Observation was made through transect walks whereby the consultants observed among other things housing and its associated sanitation infrastructure including toilets and waste disposal facilities at the household level, business infrastructure, settlement patterns and other economic activities.

Literature review

Documents and records were reviewed to obtain existing secondary data and information relevant to the study area. 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.

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, providing equitable opportunities and benefits"

The Specific objectives of constructing the Charco Dam include but not limited to the following:

- Reduce the environmental impacts caused by cattle and human activities along Simiyu River
- Enhance environmental awareness in the community
- Create employment in the community
- Improve living standards of Mwabuma villagers
- Increase availability of water for livestock and human, aquaculture 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 Mwabuma Village, Mwabuma ward in Meatu district, in a newly formed region of Simiyu. The village is located in North Eastern side of Meatu district headquarters. As mentioned earlier, Meatu district is located in a newly formed region of Simiyu, and lies between latitude 2º57' and 4º9' south of equator and longitude 34º 8' and 34º 49' East of Greenwich. The district's total area is 8,835 Square Kilometres. Meatu district was inaugurated in July 1987, before that it was part of Maswa district. Meatu is one of the 5 districts of Simiyu region. Others are Bariadi, Itirima, Busega and Maswa. At present Meatu district is divided into three (3) divisions, Kisesa in the North, Kimali at the Centre and Nyaranja in South. The divisions are subdivided in twenty five (25) wards. The total number of villages is 100. The district is also divided into two constituencies, namely Meatu and Kisesa. The location of Simiyu region is shown on the following map.

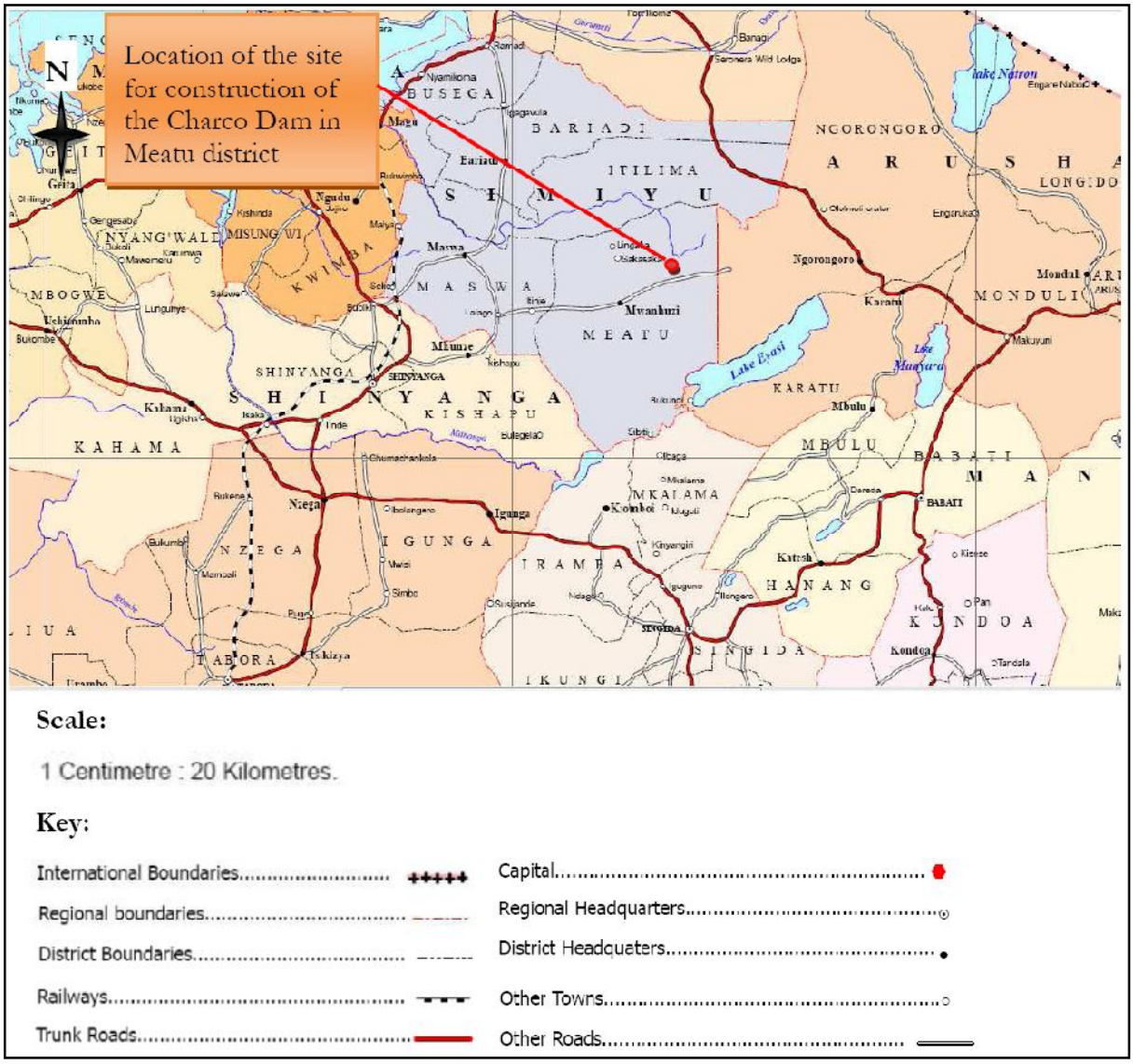


Figure 2: Part of the administrative map of Tanzania showing the location of Meatu district in Simiyu Region where the Charco dam will be constructed

2.3 Accessibility

Accessibility to the sub project site is mainly by the Mwanhuzi to Mwabuma (90 km) road through Mwakaluba village.

2.4 Project Activities

2.4.1 Mobilization phase

The Mwabuma Charco Dam which is expected to be the source of water for livestock, small scale irrigation and domestic use will be constructed to meet the requirements of the residents. Parallel to mobilization by the contractor, other activities such as community sensitization and capacity building will take place.

2.4.2 Construction phase

Once the contractor of the Mwabuma Charco Dam is secured and contract modalities are finalized, the contractor will proceed to prepare the site for works which will involve:

a) Site preparation- vegetation clearance to remove any plants or obstruction in the area likely to be inundated and areas to be used for construction of irrigations canals
b) Upgrading the access road to site in order to support heavy machinery for construction of the Charco Dam
c) Cut, fill and levelling of embankment and reservoir area
d) Materials transport from borrow areas to Charco Dam site
e) Actual construction works which will include works on the intake
f) Construction of the canal from the intake to the Charco Dam
g) Construction of the Charco Dam and other associated infrastructures
h) Construction of water trough(s) for livestock
i) Landscape and replanting of vegetation particularly creeping grass to stabilize and control erosion on the embankments
j) Training of water users committee and village council for project sustainability,

The lining of secondary canal to enable those undertaking horticultural activities will be needed and associated water distribution and control structures, excavation of drainage ditches, and spillway protection works for the Charco Dam. The construction activities will require about 20 labourers.

2.4.3 Operation phase

Cultivation, Aquaculture and Livestock Feeding Activities

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 enhanced. Some of the food crops to be grown in the area include sweet potatoes, maize and groundnuts. Others are sesame 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 fertility 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.

2.4.4 During Decommissioning Phase

Dam's and canals' life

The immediate need of Mwabuma villagers is the Charco Dam, aquaculture, livestock feeding and sustained agricultural activities. These demands cannot be met if the Charco Dam is not well protected. Dams and supporting structures such as spillway, primary and secondary canals get eroded or continue receiving sediments during their life time thus reducing their carrying capacity. In view of villagers needs, decommissioning of the project is not seen as important aspect because all efforts would rather be put towards prolonged life of the Charco Dam. Instead of planning for abandoning the Charco Dam, villagers wish number one would be to put strict plans for maintaining the structures in order to realise prolonged life.

2.5 Design of the Project

The preliminary design suggests that the Mwabuma Charco Dam will be composed of an area for livestock feeding (cattle trough), irrigation of small horticultural activities, water for domestic use and aquaculture.

The Charco Dam is designed to store water from the seasonal stream by constructing the inlet and canal into the Charco Dam. The design capacity of the Charco Dam is 20,000 m^3.

The available dam design data including sketches are provided below:

Table 1: Charco Dam design data

Element description	Dimensions
The length of the embankment	306.5m
The embankment top width	2m
The Depth of the Charco Dam	5.5m
The spillway size	1.5m wide x1.5m deep x 35m long
The core trench	Bottom width 1.5m. Slope 1:1 Depth 1.5m
The Reservoir and embankment will occupy the total area of	17,420 m^2 approximately 20,000 m^3
Excavation of the area for Charco Dam should not be less than	2m from the ground level.
Earthworks on the embankment	5152878 m^3
Volume of Charco Dam	17909.5 m^3
Embankment side slopes	U/S=1:3 and D/S=1:2
Embankment Top Level	1,335.000m
Reservoir full level	1,333.500m
Reservoir bottom level	1,329.500m

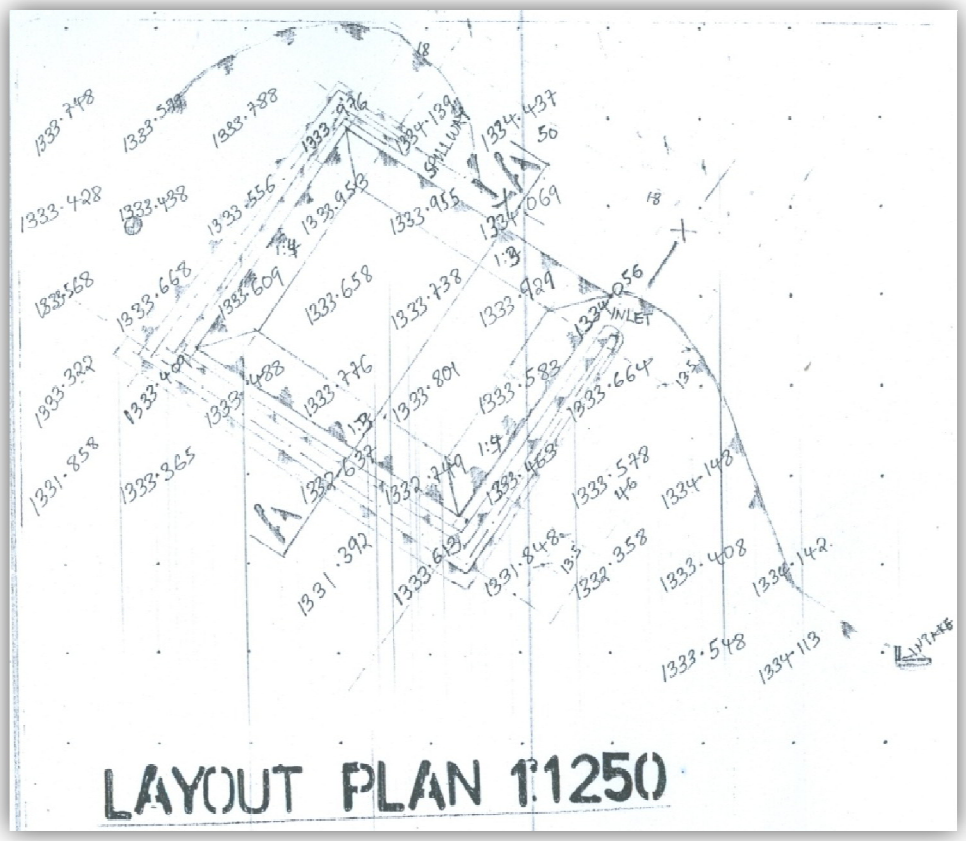


Figure 3: Preliminary layout plan of the Charco Dam

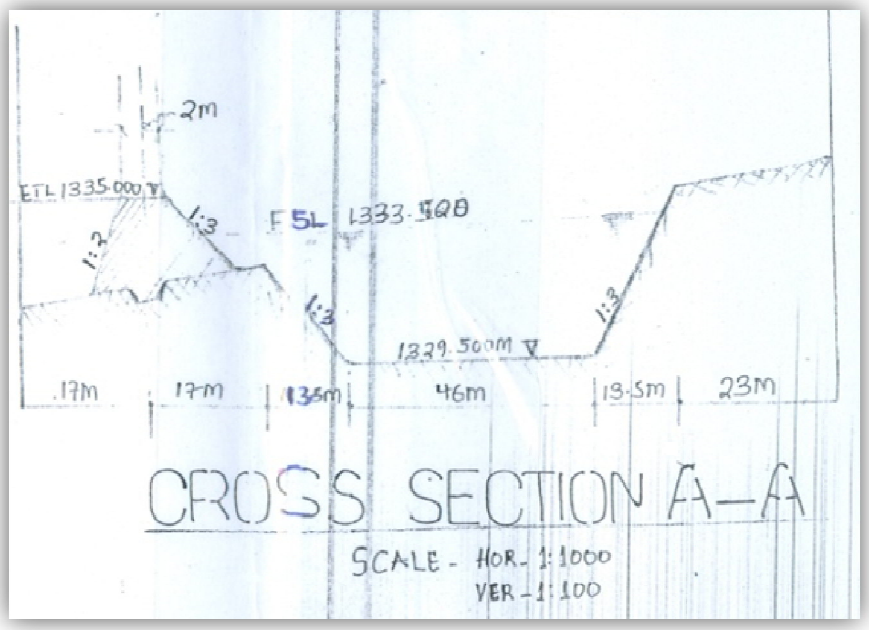


Figure 4: Cross section A-A of the Charco Dam embankment as taken from the layout plan

2.6 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 gravel aggregates or crushed stone, sand and water.

2.6.1 Aggregates for Works

Aggregates or crushed stones will be obtained away from the project area. The estimated amount of crushed stones required is 150 m^3; such volumes will be obtained and transported by trucks to the project site. Handmade aggregates will be sourced from areas where aggregate crushing is done by local communities. Fine sands of about 135 m^3 will be required for construction works.

2.6.2 Gravel

Gravel will equally be obtained from off-site borrow locations. In such situations the off-site investments will be in form of establishment of a borrow site. Since front wheel loaders and bulldozers will be based at these borrow sites, thus, there might be some off-site investment in terms of storage for fuel to run the equipment.

2.6.3 Water for works

Water will also be required for dam construction works. On the other hand, the source of water for the dam is a seasonal river, the Mongobakima seasonal river. Thus, if construction will take place during dry season, the contractor will either drill own borehole for underground water or draw water from the nearby Simiyu River.

Figure 5: The pond along Mongobakima seasonal river at the project area

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 during 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 Mwabuma Charco Dam project mainly 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. It is important to note that the project is also funded by the World Bank, which has keen interest in protection of the environment; therefore the project has to be in line with its safeguards policies. In this section, an 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. The site for proposed Charco Dam project at Mwabuma village is owned by the village and there are no people living in the area, compensation was effected to respective persons some months back, therefore no more compensation to people is required.

National Water Policy (2002)

The 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 Meatu district council intend to use environmental friendly methods in order to observe the requirements of this policy.

Under disaster management (clause 4.8.3) the policy states that there are disasters associated with Dams 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 Meatu 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 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 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 sub-villages of Mwabuma village. 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 irrigation project.

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 were observed in the area, however, Meatu 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 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, Mwabuma 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 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.

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 Meatu 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 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. The Act directs

project proponents to undertake environmental impact assessment for the projects likely to exert its pressure on the surrounding environment. In observing the requirements of this Act, the proponent has commissioned the assessment of the impacts before the project starts.

Environmental Impact Assessment and Audit Regulations 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. This respective report is the result of the proponent observing the requirements of these regulations

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 Mwabuma 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 Mwabuma village government hence no any kind further 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 No. 47 of** 1967;

In view of these requirements, Meatu 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 Meatu 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 Meatu 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 observing the requirements of this Act in parallel with other development projects in Meatu District

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 to 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. Meatu District Council in collaboration with the Mwabuma village intends to meet the 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. Mwabuma village will observe the requirements of this Act.

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.

Mwabuma 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 upgrading, installation, erection of the Charco Dam 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 and any project input 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 Meatu 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. Meatu 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 Meatu District Council and other local government structures to observe the requirements of this Act.

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 Meatu 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 in 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 in 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 they support; 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 Simiyu River. Also since the effected people are the residents of the Mwabuma 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 is may be triggered during excavation of fill materials at both existing and new borrow sites however it is no 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 local community.

3.5 Administrative Framework

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.

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 Officers 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, Meatu District, Mwabuma Ward, Mwabuma village and to the lower level of villages, 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

4.1 Physical Environment

4.1.1 Soils

The most predominant soil type is clay loam soil and somewhat like black cotton soil. The soil colour at Mwabuma is generally black and its appearance is shown below.

Figure 6: Appearance of the existing soil at the project area

4.1.2 Climate

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 rainfall pattern is unmoral with one rainy season from November to May. The southern part of a district receives a mean annual rainfall of 400mm while the northern part receives up to 900mm per year. The average annual rainfall amounts to about 800 mm to 1000 mm per annum. Its distribution is unreliable with an implication that irrigation is highly required for these area and similar areas. The mean monthly temperature in the areas is 22^{o}C.

4.2 Biological Environment

The biological study was undertaken in 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, with special attention given to possible endangered species.

As it is clearly known that development projects may have both negative and positive environmental impacts, as they involve vegetation clearing which supports the lives of animals for 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 done. In the project area, none of the plant species in these categories were identified.

The findings on flora and fauna found out that the area for Charco Dam development has been subjected to regular human activities and therefore no special ecological feature was recorded due to the diversity of activities carried out in the area and noted that there

are common plant species which are found in most of the areas. No wild animals were observed at site during the site assessment.

It was concluded that since the area will be inundated, it is strongly advised that all mitigation measures for removal of common plants must be adhered to, in order to minimize likely impacts on the quality of water.

The villagers under the guidance of Water User Committee will have to establish tree nursery and plant seedlings of trees to the surrounding areas in order to replace the amount of woody to be lost during vegetation clearing for project activities and wind breakers.

4.3 Socio-Cultural Environment

4.3.1 Population

Mwabuma village is one of the villages in Mwabuma ward, Meatu district in Simiyu region. The village is found in North East of Meatu District Headquarter. Mwabuma village has a total population of 5,878 of which 2,703 are men and 3,175 are women with a total number of 840 households. The village has 2,439 (1,123 Male and 1,316 Female) people who are capable of engaging in development work. The village also has 2,340 cattle, 489 goats and 189 sheep. The main activities in the village are agricultural activities i.e. livestock keeping and cultivation of crops.

4.3.2 Existing Land use

The proposed area is productive in traditional agriculture and used for grazing. Generally the area around the project is used for agricultural purposes. The neighbouring land is occupied by individual farms such as for sweet potatoes, maize, cotton and sesame. Compensation for the proposed land was done within the village under supervision of village council.

4.3.3 Economic Activities

4.3.3.1 Income Generating Activities

The districts major economic undertakings include farming and animal husbandry. It is estimated that these two sectors contribute about 60 -85% of the district GDP. Other sectors are small scale industries and trading which constitute about 15% of Meatu district's GDP. Cotton is the leading cash crop. Maize, Cassava, Groundnuts, vegetables (Tomato, Onion, Cabbage) Millets and Sunflower follows. The district has a good number of indigenous and few numbers of improved cattle. Sheep, goats, pigs and donkeys are also domesticated on small scale.

The analysis of social economic activities determined income and expenditure pattern of people living in the villages. Both genders are involved in ownership and utilization of production resources. Although men are still regarded as the family breadwinner gender relationships reflect the importance of both men and women in the present socio-economic set-up and activities in the area.

Ownership of means of production such as land, labour, basic capital assets and seasonal inputs such as seed is also gender balanced. However, at the end men are regarded as the owner and final decision maker over the family resources. Both men and women are engaged in agriculture, retail business, operating food-vending, market trading and casual labour.

Agriculture and livestock keeping

A: Agriculture

It is estimated that about 80% of the population in the district depend on agriculture and livestock keeping for their livelihood. With arable land of 4,656 sq. kms ideal for agriculture, it is anticipated that if modern crop production and improve animal husbandry is applied; the district could increase production of both food and cash crops tremendously. Data shows that, the district produces an average of: 25,000 tons of cotton, 23,503 tons of maize, 31,239 sorghum tons of sunflower 164 tons annually.

Food Crops

The food crops grown in the district includes maize, sorghum, paddy, cassava, sweet potatoes and groundnuts. With good rains the district produces excess maize and paddy which are sold to other districts. Agricultural production is adversely affected by various factors which includes unpredictable and unequal distribution of rainfall, low soil fertility due to wind and water erosion, non adherence to proper crop husbandry practices, dependency on rain fed agriculture, lack of access to credits by many farmers, use of low yielding local seed varieties and low use of farmyard manure and industrial fertilizers. Food shortages occur during years of lengthened drought periods which lead to poor harvests. Other causes of food deficiency include lack of storage structures at household level; depend as a source of income and low use of pesticides. Some farmers are forced to sell food stocks for acquiring money for the other uses such as paying school fees and obtaining money for medical cost which results to food shortages.

Table 3: Estimated Food Crops Production

Year	Maize [tons]	Sorghum [tons]	Sweet potatoes[tons]
2007	25,206	27,429	12,917
2008	41,095	24,504	15,154
2009	31,492	28,193	11,815
2010	23,503	42,039	21,204
2011	28,995	31,239	15,536

Source: Meatu district social economic profile, 2011

Cash Crops

Cotton is the main cash crop grown throughout in the district. Rice and maize that are both cash and food crops are also grown in the area. Most farmers in the district till the land using animal pulled ploughs and hand hoes; only a few use ,power tillers and tractors. They use animal –pulled carts to carry their farm products and equipment.

The use of ox and donkey ploughs to till the land is now becoming popular with the introduction of ploughs and more recently the ridges and planters; a striking example is in2007 when the district had ploughs, ridges harrows, and tractors.

In terms of cash crops, Meatu district is among the major producers of cotton in the region. Cotton is the major cash crop in the district. The other cash crops produced in the district are sunflower and tobacco although its production is small. In spite of fervor to grow cotton, farmers face a problem of easy access to credit for the purchase of inputs such as pesticides and poor mechanization. On the other hand, poor prices offered by private buyers as well as inabilities of Cooperative Union to support farmers have enlarged the problem. The tables below depict the area utilized in crop production as well as estimated tons produced.

Table 4: District annual Cotton and Rice production trends (Tons)

Year	Cotton [tons]	Rice [tons]
2003	25,162	987
2004	36,899	270
2005	14,624	366
2006	28,246	4,413
2007	44,126	945
2008	37,594	863
2009	31,313	3,871
2010	26,675	4,952
2011	25,081	3,780

Source: Social economic profile, Meatu District council, 2011

Figure 7: Cotton Plantation one of the major cash crop

B: Livestock Keeping

Livestock keeping has an importance to the life of the people in the district. It provides the people with high quality protein products such as meat, milk and eggs. Animal protein is widely supplied and consumed in Simiyu region. In all the region's districts some livestock including cattle, sheep, goats and chickens are kept.

Meatu district is very famous for livestock keeping. The district has 447,051 cattle, 243,508 Goats, 40,012 sheep, and 528 Pigs, (2002 Census). On the other hand number of livestock in the study area is as shown below.

Table 5: Distribution of livestock in Mwabuma village in 2012

Type	Number
cattle	2,340
goats	489

Source: Mwabuma village livestock records 2012

About 68% of the district's households keep livestock. Cattle and donkeys are used for tilling the land (i.e. pulling ploughs) and for carrying farm produce and implements (i.e. pulling carts). However, the district suffers from the problem of overgrazing. Livestock rearing, as practiced in the district, involves free-range-grazing. The practice leads to land degradation and environmentally non-sustainable rural development.

Livestock diseases

Livestock diseases in Meatu district lead to poor livestock health, reduced milk production and even deaths. The diseases of economic importance in the region are the tick borne diseases namely East Coast Fever (ECF), Anaplasmosis, Babesiosis, black quartor, and Heart Water. Others are Contagious Bovine Pleuropneumonia (CBPP) and

Trypanosomiasis in those areas infested with tsetse fly. As far as poultry is concerned, the major livestock diseases include; new castle, F. Pox, F. typhod, Coccidiosis and F. cholera.

Wildlife

The district has one game reserves and one game controlled area. The game reserve is Maswa, which borders the Serengeti National Park in Bariadi district, and controlled area is Makao Wildlife Management which covers a total area of 4,210 sq. km. A spacious variety of wildlife can be found within these game conservation areas such as hippo, lion, zebra, buffalo, wild dog, bushbuck, impala, giraffe and baboon. The fairly large wildlife areas in the region with a diversity of wildlife species already attract a fair number of tourists. However, these wildlife attractions are yet to be developed in terms of tourist accommodation, camping sites for tourist hunting and alike.

Fishing

Fishing activities in this district is in small scale production. The most known source of fish is Lake Kitangiri whose production records have commercial status. Fish river production is also done in Simiyu River during the rainy season, although production is diminishing due to poor management of the river. In 1980 the river functioning well, but to date is functioning during the rainy seasons only. It is imperative to conserve Simiyu River for nutritious and economic sustainability for the communities along the river and that is the main goal of this project.

Mining

Mining activities, formal and informal, are scaled small and artisan mining operations within the district. The local people have established most of the existing gemstone and salt mines. The government has not started set aside some of the mines for formal and large-scale operations involving the private sector. Meanwhile, building materials like sand and stone are mined indiscriminately, as there are no specific earmark areas.
The most popular mineral in the district is salt which mined at Lukale village by small scale miners. In the context of the district, large-scale miners do not exist to cover the extensive exploration works and set up mining infrastructure. The mined salt is sold locally within the region.

4.3.4 Sectoral Impacts on Development and Environment

Impacts of the mining activities carried out in the district on the development and environment of the town and district are both positive and negative and in either case quite substantial. The mining industry engages very few people directly or indirectly and

thus, serving as a minor source of income to household members and revenue to Meatu district council (MDC). There is a need to undertake extensive exploration.
Besides salt germ stone mining in the district, indiscriminate extraction of sand, gravel and other building and construction materials continues to generate employment opportunities and income to many people in the town including women and the youth However, the mining industry is not environment friendly as it involves deforestation, soil erosion, river silting and un-filled pits.

Environmental Impacts on Sectoral Development

- Lack of designated areas for sand excavation and quarrying activities has led to land degradation in the town
- Low technology and poor equipment applied by the small-scale and artisan miners have a negative bearing on profit margins.
- Lack of basic community facilities at the mines may lead to unnecessary epidemics and social disharmony.
- Water scarcity is a major limit to mining and processing.
  Industrial Development

4.3.5 Provision of Socio Services

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

Health Care

The available data shows that, Meatu district is not well served with health facilities and they lack medicine and other qualification requirements. However, there have been considerable increases of health facilities within the district. For example, there has been an increase of dispensaries from 33 in 2008 to 35 in 2011. In general most of the people have to walk about 5 kms from their homesteads to the nearest health facility.
In the study area there is one dispensary which serves Mwabuma village and other nearby villages.

Table 6: Distribution of the health facilities 2011

Hospital	Health centre	Dispensaries	Mobile clinics
1	20	35	4

Source: Meatu district social economic profile

Common Water-borne Diseases

The district is characterized by high death toll resulting from common preventable diseases such as malaria, typhoid, dysentery, skin infection, worms and bilharzias. These diseases contributed high morbidity to majority of people in the district in 2011. In this case Mwabuma village is not exceptional and construction of charco-dam should take into account preventive measures to reduce the diseases related to inadequate of clean and safe water and use of water from unprotected source such as charco-dam which may lead to spread the diseases mentioned above.

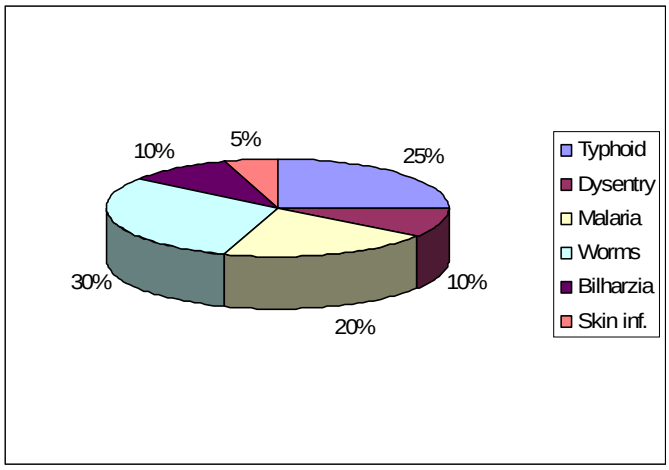


Figure 8: Common Water-borne Diseases in the Study Area

Source: Meatu district social economic profile, 2011

Infection with HIV

In 2006 there were 209 people who were diagnosed with HIV and these numbers were grown to 4,047 people who were infected with HIV in 2011. The data shows that both genders are in danger of being infected as shown in the table.

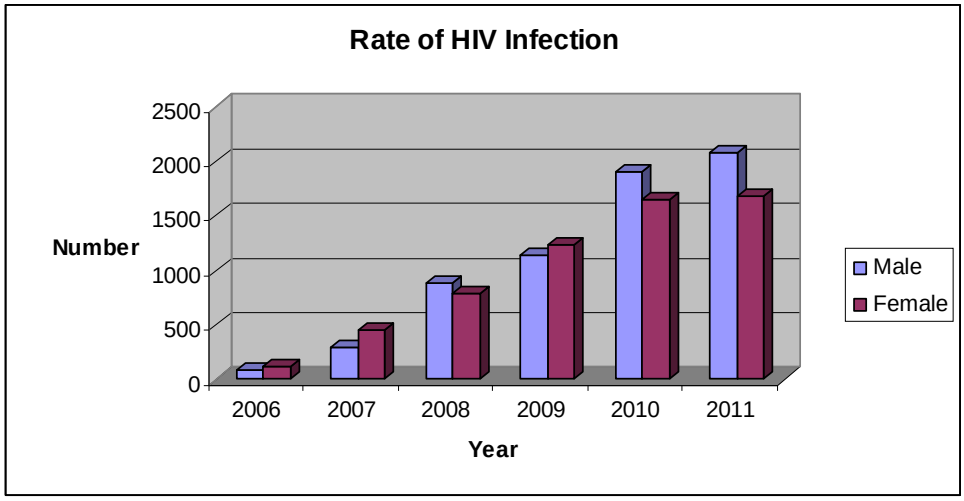


Figure 9: Number of People Diagnosed with HIV (Total from VCT, PMCT, PITC and Blood donors)

Source: Meatu district social economic profile 2011

The problem of HIV is becoming huge problem to the underdeveloped areas. The attraction areas which cause the disease to spread in such rate are the economic difficulties in the district. It had observed that during the selling of cotton people earn more income and they decide to engage in hard drinking which contributing to spread of the disease. The major affected areas in the district are Bukundi ward, Mwanhuzi, Itinje, Nghoboko and Mwandoya.

Malnutrition

Due to shortage of food to some of the household in the district has lead to malnutrition. The shortage of food in the district is mainly contributed with the scarcity of the rain (persistence of prolonged dry) which ends up with poor production. The data shows that in 2007 there were 0.6% of children who had moderately underweight, 0.2% severely underweight while in 2011 there were 1.7% of moderately underweight and 0.2% of severely underweight. This indicates that there was an increase of moderately underweight by 1.1% compared to 2005.

Education

In the district there are 56 pre-primary classes, 111 primary schools and 22 secondary schools. Looking at Gross Enrolment rate (GER) in primary schools it shows that boys have 118.7% and girls have 112.3% which makes an average of 110.5%. It means there are children above 7 years who are enrolled in school. Net Enrolment rate indicates that both boys and girls have 100% that all children with 7 years of age were enrolled in schools. Regarding to drop out of student in recent years girls were more in 2008 to 2011 as compared to boys. The most causative of drop out were truancy and pregnancy as it indicated in the table below.

Table 7: Drop out of students

Year	2008		2009		2010		2011	
Reason	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl
Pregnant		5		2		5		3
Truancy	135	151	134	142	149	165	105	139

Source: Meatu District social economic profile, 2012

To mitigate the drop out of students' teamwork between parents and school committees and teacher are very much required. However, in the project area there is one primary schools and one secondary school.

Water and Sanitation Sector

The National water policy in its long term programme has directed that at least every person should have access to clean and safe water within a distance of not more than 400m. by the year 2002. In response to this policy, surface water evaluation in the district has been developed by construction of Chaco-dams, shallow wells sources, Borehole, rain water tanks in different areas of the district.

Mwabuma ward communities have no community piped water supply; they depend on underground water resources. Simiyu River is the main surface water resources in the area. Other distributaries are seasonal. Shallow wells and local shallow wells are common in the area. The percentage of the people who have access to clean water is 54.6%. According to the information gathered from meetings in the study area, availability of water from most of the sources is relatively constant throughout the year and particularly from shallow wells. Mwabuma village has 24 shallow wells of which 23 are functioning and only one well is out of order. It was revealed that clean water is available in the entire village with a reasonable distance as per National Water Policy.

Figure 10: One of the boreholes for domestic water supply at Mwabuma village, with pump, which is located at the proposed site for construction of the Charco Dam

Sanitation

Hygiene behaviour has a critical influence on the transmission of disease at various stages. This is particularly true in situations where disease risks are acute due to poor hygiene practices, unsafe water and sanitation. The most common result is the incidence of diarrhoea diseases which constantly affect the study area.

Construction and use of latrines in the study area may pose a threat to health since people tend to ignore the need to construct good toilets compared to the main houses. At Mwabuma village 57% of the households have poor quality toilets due to ignorance and the habit of not valuing toilets. Despite the frequent occurrence of epidemic diseases in the study area like typhoid, amoeba, dysentery and cholera according to the study data 43 % of the entire population in all villages do not use latrines instead they 'relieve themselves in the bushes and Simiyu River when they take bath.

Figure 11: Type of common toilet at Mwabuma village

Information collected from meetings revealed that there are is beliefs or customs behind the habit of not using latrines which make people reluctant to construct and use them despite massive campaigns during cholera out breaks. Another reason for not using latrines is the availability of alternative places for disposing faeces which is in bushes and in the river Simiyu.

Human faeces may contain a range of disease causing organisms including viruses, bacteria and eggs or larvae of parasites such as worms. The micro organisms contained in human faeces may enter the body through contaminated food, water, eating and cooking utensils and by contact with contaminated objects.
Villagers complained that toilet facilities were problematic in smell, unsafe during the wet season when latrines can sink; due to poor design and lack of privacy were the main concerns. Mosquitoes and flies were other problems, although villagers generally use ashes to reduce the odour. The proposed charco-dam is designed to collect storm water from upstream where hygienic behaviour is not best practiced; it means water in the dam will be very much polluted if comprehensive health and sanitation strategies are not put in place to sensitize the community on toilet use and other health related behaviours.

Housing and settlements

Shelter is one of most important human basic needs. Good housing has a close correlation with good health and other aspects of human dignity and well being. Though there is lack of clear-cut on which is proper and good housing facility but enough and well-ventilated rooms, kitchen and toilets provision were used to determine the quality of the shelter in the study area. Moreover type of structures and materials used in construction were also primarily used to determine the quality of the houses in the villages. The situation of housing in the study area exhibits typical rural infrastructure. About 80 percent of houses in the villages are semi permanent constructed by poles and mud thatched with grass, while the remained 20 percent comprises of houses made of cement bricks, with cement floor, plaster and roofed with iron sheets.
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 mitigation 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.

Road Networks

Transport sector has valuable role in causative to social and economic development of Tanzania. The sector performance has continued to grow due to both government efforts and private sector investment in road rehabilitation. Meatu district has an estimated road network length of 1,030.3 kms Out of which 135 kms are Regional roads, 176kms are District roads and 719.3 are Village or feeder roads.

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^{o}C.

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 Consultation and Public Involvements

5.1 Introduction

Stakeholders and public involvements in the initial stages of any project are of great importance particularly in planning, design, environmental and social impacts assessment and implementation of the proposed development.

5.2 Stakeholders' consultation

Stakeholders' consultation involved the necessary potential Interested and Affected Parties (I&APs). The comments received during consultation and issues raised by various personnel in Meatu district have been incorporated into the PEA report and used in determining mitigation measures for the project.

The key stakeholders who were involved are listed below:

- District Administrative Secretary
- District Land Officer
- District Natural Resources Officer
- District Environmental Management Officer
- Water Laboratory Technician
- District Water Engineer
- District Economist

5.3 Public Involvement

In arrangements to meet with local people, the communities surrounding the project area were sensitized to participate in the meetings. The meeting was communicated to the community on 22nd June 2012. In the process, invitation letters were served to Mwabuma Village Executive Officer to inform the community to participate in consultation meetings. On 29th June 2012, the meeting was held at Mwabuma village to discuss on the proposed Charco Dam construction. The following are some of the pictures taken during the meeting.

Public participation was made through public meetings and it 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.

Figure 12: The pictures for public consultation meeting at Mwabuma village

Almost all residents of Mwabuma ward will be affected by the project, because, it is located in an area where they share the land for grazing 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 these 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 Participation

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 Concerns drawn from Key Stakeholders

The views collected from the consulted officials in Meatu district were recorded as summarised below.

District Administrative Secretary

- The dam will help reduction of environmental pollution along Simiyu River and you have to facilitate construction of the dam as early as possible so that the community can enjoy the expected benefits.

Water Laboratory Technician

- We have the problem of Fluoride in underground water in most areas, so the dam will be helpful.

District Water Engineer

- The water table is about 6 – 9 m under the ground level in Mwabuma ward.
- the contractor has to avoid conflict with the community on water usage and has to find his own source of water for construction
- The dam will depend on rainfall
- The proposed area was owned by one person who was compensated after negotiation, under the village government.

District Land Officer

- The proposed area has no land ownership problem, you just go and conduct the meeting and ensure that people have participated well in discussion in the meeting.
- The contractors should use local casual labour
- the dam should be strong enough so that it can be sustainable as we get fluoride in most areas in underground water

District Environmental Management Officer

- The contractor has to avoid unnecessary vegetation clearance
- Our area is very dry; the contractor should use water sprinklers regularly to minimize the dust
- Educate the local people in dealing with HIV/AIDS.
- The camps for contractor should be located where the village leaders will suggest so that they may use the building after the project use.

5.4.2 Issues from the public meeting at Mwabuma village

(i) The issue of the Charco Dam was planned long time ago, and what we need is the dam, we request you to help us to keep its environment clean.

Response: It takes time for legal procedures to be fulfilled before commencement of construction. Other measures to keep the dam clean and safe include the following:

- avoid environmental pollution in the catchment area;
- Soil erosion should be avoided and where possible controlled e.g. by not grazing at the upstream side; which can be done through zoning the area
- Swimming in the dam should not be allowed;
- Proper toilets at home have to be constructed and used effectively;
- faecal matter should not be spread on land;
- The dam must be protected from any sort of damage, as it is for the use of the village, and the committee for managing the dam shall be formed.

(ii) We want to introduce fishes in the Charco Dam.

Response: The Meatu district authority will find the best way to involve aquaculture such as consulting experts in the field of aquaculture and find the best species to introduce in the Charco Dam.

(iii) You have said that the activities we are doing along Simiyu River contribute in environmental pollution in Lake Victoria, so what about the wild animals in Maswa Game Reserve, are they not polluting the environment? The government should also control the wild animals not only our cattle!

(iv) Mwabuma ward is very large, so one Charco Dam is not enough for us, what do you think to solve this problem? We want at least three Charco Dams in order to avoid high population of cattle in one trough to be located at one area for the entire ward. Comment to be passed on to the project proponent.

(v) We want the water tanks and troughs to be constructed at the Charco Dam so that the livestock can drink well without disturbance. This is very important because there was no problem when we used to feed in Simiyu River. Comment to be passed on to the project proponent.

(vi) We want the contractor to construct the toilet near the Charco Dam so that those who will be going for various needs at the Charco Dam can use it and thus avoid polluting the Charco Dam. – The comment was noted as a positive mitigation measure to be included in the issues for implementation

(vii) We need the Charco Dam to be constructed as early as possible before commencement of the rain season.

5.4.3 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:

i. Constant water supply to the cattle and irrigation and for domestic use due to the fact that they are now restricted to use Simiyu River for livestock and agriculture.
ii. Fish may be introduced in the dam that will eventually increase nutritional diet and income generating through fishing and other fishing related activities.
iii. 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 workers and casual labour employment.

iv. Since there will be enough water throughout the year, horticulture will be introduced and increase income to both youth and women.

Generally, the construction of the dam will have tremendous positive impacts on the village and district economy.

5.4.4 Perceived negative Impacts of the Project

People worries over the project include the following:

i. Environmental degradation resulting from noises, dust, tree cutting, soil erosion and air pollution.
ii. Distance from the dam to other sub villages (*Kitongoji)* is long such that bringing cattle for watering will be difficult!
iii. The dam will breed mosquitoes which lead to malaria and when contaminated will increase cholera, dysentery, bilharzias
iv. Children might be drowned when swimming!
v. Influx of job speculators from other parts of Simiyu region and neighbouring regions will increase interaction, consequently an increase in HIV/AIDS infections. The presence of HIV/AIDS will likely increase the number of orphans in the project area. Infidelity among job speculators and local people may lead to divorce and separation of some families.

5.4.5 Design considerations 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

i. Health, sanitation and hygiene best practice awareness should be enhanced to reduce water contamination
ii. Provide enough cattle trough to meet the demand of all cattle in the village.
iii. Introduce fish farming culture to the surrounding communities
iv. Provision of buffer zone to avoid siltation
v. Build a toilet near by the dam
vi. Provide shifts for livestock drinking [each *Kitongoji* should have its own shift]
vii. Establish bylaws to protect people still using Simiyu River for cattle watering

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 8: Positive Impacts and Enhancement Measures

S/N	Positive Impacts	Proposed Enhancement Measures
1.	**Reliable supply of 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. - Improved livestock infrastructures like cattle dips, abattoirs, hide processing, livestock markets, veterinary centres, 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.
2.	**Reliable supply of water for domestic purpose** The residents of Mwabuma ward depend on the drilled boreholes 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 and destruction with cattle.
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 the improved 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. - Arrangements and efforts should be directed at identifying investment potentials such as fishing, sustainable use of forestry products and bee-keeping with capability to increase sustainable resources use.
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.	- Meatu district authority will have to conduct capacity building in order to enhance the benefits of the proposed project. - Agricultural empowerment must be related to new technology and establishment of market facilities and knowledge of food processing and preservation. In specific efforts should made in promoting irrigation, use of modern agriculture equipment and inputs.
6.	**Opportunities for temporary employment**	- The contractors will have to employ youths who register with village government offices since they

	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.	(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 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.
8.	Reduction of environmental pollution in Simiyu River	- To enhance natural resources conservation constant meetings will impart knowledge and policies about resources along Simiyu River and the participation of the Community towards preserving them. - To enhance natural resources conservation constant meetings will impart knowledge and policies about resources along Simiyu River and the participation of the Community towards preserving them.

6.2 Negative Impacts

6.2.1 Mobilization Phase

The issue of land acquisition is not a problem as the villagers have already compensated the land owner. The identified impacts are described below.

i. Loss of natural aesthetic value

Loss of natural vegetation is expected due to inundation along the Mongobakima seasonal river course. The type of vegetation available will not be able to exist in high water level, they will dry up or rot once submerged. However, at the project area, about 60% of the vegetation is already cleared as a result of cultivation and grazing.

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 Meatu 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.


Figure 13: Existing condition of vegetation at the proposed project area

ii. 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 housekeeping to minimize waste generated from construction works
- Allocate a special area for petty business such as food stalls furnished with garbage bins.
- Assign Contractor's Environmental or Safety Officer the responsibility to ensure that the surroundings are kept tidy
- 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 from 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.

Figure 14: Eroded area along the Mongobakima river bank at the project area

Figure 15: Sisal plant in the project area

Sisal plants found at the project area seem to control erosion but in some areas with bare soils as it can be seen on the picture above, soil erosion is very likely. These plants can be used to control soil erosion if they are planted around the dam

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 creeping 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.

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 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. Dust and air pollution 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 water in the borehole which is very close to project area 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. 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 Mongobakima River.

Mitigation Measures will include:

- During construction–ensure that machines are properly serviced and checked to make sure that they do not leak (lubricants and fuels)
- No machine refuelling shall be carried out within 100 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

vii. Child labour

Mitigation measures

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

viii. Disturbance to people going to draw water at the borehole located near the proposed area

Mitigation measures

- The path to the borehole should not be blocked by the contractor; if used, then alternative path should be constructed on agreement with the villagers through the village government.

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 disease vectors. 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

- Clear vegetation near the reservoir to ensure constant water level variations and 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.

ii. Soil erosion

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.
- Spreading and compacting the aggregates to a depth of at least 5 inches around the drinking area will help to reduce soil erosion
- Planting of grasses/sisal (*Agave sisalana)* in areas which are at risk of being eroded will help to reduce soil erosion

Figure 16: Sisal (*Agave sisalana*) species which can be planted to reduce soil erosion in areas restricted for access

iii. Soil Salinity

Intensified agricultural production on an irrigated land will 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:-

a) Irrigation water containing salts will evaporate leaving the salts to accumulate
b) Artificial or natural fertilizers may not all be absorbed by plants, leading to accumulation in the soil
c) Salts may occur naturally in the soil aggravated by lack of enough rain to leach it away
d) 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. (addition of gypsum before irrigation)
- Use of salt tolerant crops.

iv. 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.

v. 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

vi. 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 human activities such as washings, dumping, swimming and drawing water will take place direct in the reservoir; instead, only the domestic points (taps) will serve water to the people.

Health and Safety Measures of Workers and Local Community

vi. 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.

vii. Risk to life

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

viii. Influence on community life style

The construction of the Mwabuma Charco Dam, particularly use of the dam in agricultural activities will have a significant impact on the day to day lives of Mwabuma 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.

ix. 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.
- 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.

x. 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 Mwabuma 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

The mitigation measure will include

- 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 9 below.

Table 9: 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 impact assessment matrix shown on Table 10, 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 10: 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**
Availability of fish and fish products due to aquaculture	✓			✓			✓			✓		**Medium**
NEGATIVE IMPACTS												
During Construction												
Vegetation Clearance for input to dam Engineering Design	✓		✓		✓				✓	✓		**Medium**
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	✓		✓		✓			✓			✓	**Medium**

emissions around the construction site and material hauling routes												
Generation and poor disposal of solid and liquid wastes	✓		✓				✓	✓		✓		**Medium**
Social-cultural changes		✓		✓			✓			✓		**Low**
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	✓			✓			✓	✓		✓		
Landscape scars at un-rehabilitated borrow sites	✓			✓			✓	✓			✓	**Medium**
Increase in HIV/AIDs cases	✓		✓		✓			✓		✓		**Medium**
Increased breeding sites for mosquitoes (malaria) and other disease vectors	✓			✓			✓	✓			✓	**High**

Table 11: 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	**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	+1	+1	+2	+2	+3	+2	+2	+2	+2	+2	+1	-2
Increased income	+1	0	+1	+1	+1	+2	+1	+3	+2	+2	+1	+1	0
Availability of irrigation water	0	0	0	0	+1	+2	+2	+1	0	0	0	+1	0
Increased in crop production	0	0	0	0	0	0	+1	+2	+2	+2	0	0	0
Reliable Supply of domestic and livestock water	0	0	0	0	+1	+3	+2	+3	0	0	0	+1	0
NEGATIVE IMPACTS													

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

Table 12: Analysis of Project Site Alternatives

Options	Anticipated Impacts
Option 1 **Upstream of the Proposed Location**	*Environmental and socio-economic issues* - The catchment area is small, thus the expected volume of water for the Charco Dam cannot be achieved - The site is situated in area where there is lesser area for agricultural activities. - The site is occupied by settlements, thus, the risk to people and property will be much higher compared to the site downstream
Option 2 **The present Location**	*Environmental and socio-economic issues* - 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 is already paid - Most of the area is deforestated - Strategically located to minimise disturbances to physical features
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 Simiyu River banks has to continue. - Environmental BENCHMARK thus seconds the recommendation that the construction of the proposed Charco Dam on the preferred alternative 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.*

In view of the requirements of the dam, 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, it is worth to note that the environmental and social impacts assessment focused its findings on the identified, preferred, and present location. The study has identified and discussed the anticipated potential impacts and suggests possible mitigation measures to minimize detrimental impacts.

9. Environmental and Social Management Plan

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 Meatu District Council. To minimize potential environmental and social negative impacts, the project will require the support of various institutions in the project area. Table 13 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

Environmental Representative from Meatu 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 Environmental Management Expert is the link person between the region and the Director of Environment as well as the Director General of NEMC.

Mwabuma Charco Dam 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 is 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. In case the conflict becomes complex then the Water User Committee will be reporting to the

Meatu district Authority for more clarification. On top of that, the village council is well prepared to manage the project.

Table 13: Environmental and Social Management Plan

Environmental and social Parameter	Indicator-mitigation target	Responsible for mitigation	Time Frame	Estimated Cost TZS
Vegetation loss during Site clearance	Limit clearance to 4 acres only.	Villagers/ Contractor/ 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; plant grasses. Grazing and cultivation activities are not taking place in the slopes of the catchment area.	Villagers/Supervising Engineer/District Environmental Management Officer	Monthly routine throughout project life	300,000
Water / Soil Contamination	Both liquid and solid management and sanitary measures are sufficiently practiced. Wastes deposed to landfill.	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 as possible, ensure re-vegetation. Plant 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 and dispose non-reusable to landfill.	Villagers/ Supervising Engineer.	During construction works and operation activities.	250,000
Dam Breach	Strong embankment.	Villagers/ Contractor and Supervising	During dam and associated	200,000

		Engineer	structures construction	
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	Contractor / villagers/ 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	Contractor/ Supervising Engineer and Irrigation Officer.	During Construction and Operation phases	100,000
Increase in Water related diseases	No or minimal water related diseases. No unnecessary entry to the reservoir.	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	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	Villages government	During Operation phase	200,000
Increased crime and social conflict	Sensitized communities against bad habits and no offences within the communities in relation to irrigation project	Supervising Engineer/ respective village government	During Construction and Operation phases	200,000
Water user & Land Conflicts	Every villager gets a plot in the irrigation system. Form Water User Committee.	Village government and dam committees.	During Operation phase	250,000

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. These audits assess the relevance, efficiency and impact of any mitigation measures administered. Environmental Officers in Meatu 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 Charco Dam project. 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.

Meatu District Environmental Management Officer will be responsible for monitoring environmental impacts after construction of the Charco Dam. Meatu 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 Management Officer, 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

Contractors' appointees to deal with Environmental Management will cooperate with District Environmental Management Officer and other sectoral officers in Meatu District 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 Environmental Management 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 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. Cost estimated for monitoring activities is also presented.

10.3 Environmental Monitoring Plan

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 that is the essence of this environmental and Social Monitoring Plan as presented on the table below.

Table 14: Environmental Monitoring Plan

Parameter To Be Monitored	Sampling Area	Management Method	Target Level	Responsible Organ	Time Frame	Estimated Costs (TZS) Remarks
Pre-construction Phase						
Vegetation loss	Charco Dam and access road sites	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 during site	Charco Dam and access roads sites	Wastes collected and disposed off in	Wastes disposed safely	District Health Officer/ District Environment	Once before start of construction	200,000

clearance		appropriate places		Officer		
Land loss and fauna and disturbance	Dam site and access roads	According to plan	Land loss limit according to engineering design	District Natural resources or Forestry officer/ District Land Officer (DLO)	Once during site preparation	200,000
Construction Phase						
Poor air quality from 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 generated	District Health Officer/ District Environment Officer	Weekly during construction phase	200,000
Water/Soil Contaminatio n	Domestic tap point or trough, canal, access road	Water not contaminated 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 during construction 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 Office	Twice- when equipments are mobilized and weekly routine after start of construction	200,000
Influence on Community Life style	Constructio n 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
Soil pollution during civil	Dam site, and access	Measures are put in place	No soil contamination	District Natural Resources	Monthly during construction.	200,000

work construction	roads			Officer/ DLO		
Operation phase						
Soil erosion and dam Sedimentation	Livestock routes, nurseries, canal and access road	Soil erosion control measures are put in place, Afforestation of the catchment area	Siltation occurred in the dam	District Irrigation Officer/DEMO	Twice a year and after every heavy rain	400,000
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 Contamination	Domestic tap point or trough, canal, access road	Water not contaminated 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
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/DEMO	Twice during construction phase and twice per year during operation phase	200,000
Risky to life	Charco Dam	Well fenced dam to restricting 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	Mwabuma villagers	Communities sensitized.	No offences reported.	Community Development officer	Once during mobilization, construction and operation phases	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						**3,850,000**

11. Summary and Conclusion

The Preliminary Environmental Assessment (PEA) study for Mwabuma Charco Dam has been completed by describing the project characteristics and identifying and evaluating the impacts. The project beneficiaries are looking towards 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 and they proposed mitigation measures which were incorporated in this PEA report. The consultants also carried out consultation with the local communities around the project area to integrate their requirements in the project. This consultation enabled the Consulting team to have a physical feeling of the local conditions around the project site.

This project is essential for the residents of Mwabuma ward as they expect to benefit in the fields of livestock keeping, aquaculture, irrigation in small scale horticultural activities, water for domestic purposes and other uses of water for daily life.

Most of the project negative impacts can be mitigated with appropriate measures. Constant involvement of LVEMP II, the Contractor and Meatu district authorities, as well as village government authorities and the local communities in the project area will be required to implement and monitor the mitigation measures. Monitoring of environmental and social impacts will be important in ensuring sustainable development of the project.

Among the significant environmental impacts that will result from the Charco Dam project operation is soil erosion. Soil erosion will result from congestion of livestock at the troughs, drinking area and along their routes to the dam. The toilet will be constructed at the Charco Dam in order to be used by water users in the area and hence reduce environmental pollution which results from scattering of faecal matter.

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

The Mwabuma Charco Dam construction is estimated to cost about Sixty Three Millions, Five Hundred and Ninety Five Thousands, and Seven Hundred and Fifty (TZS 63,595,750) Tanzania Shillings. The project supervisors from LVEMP II and Meatu district council will ensure that the project is well managed in order that the proposed amount of money is utilized as intended.

References

1. Meatu District Council Profile, 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)

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Date: **26/07/2012**

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

Project Manager,
Lake Victoria Environment Management Project (LVEMP),
P.O.Box 211,
Mwanza. ***Attn:*** **Eng. Anna Mdamo-LVEMP**

RE: SCREENING DECISION ON THE PROPOSED CONSTRUCTION OF A CHARCO DAM AT MWABUMA VILLAGE IN MEATU DISTRICT, SIMIYU REGION

We acknowledge receipt of the dully-filled Registration Form and project the brief for the above project. Kindly be informed that the project has been registered and allocated Application Reference Number **1939.**

Following the scrutiny of the Registration Form and the project brief, we wish to inform you that according to the Environmental Management Act Cap 191 and the subsequent EIA and Audit Regulations, 2005, as well as the information provided in the project brief, your proposed project may or may not require full EIA study. You are therefore required to conduct Preliminary Environmental Assessment (PEA) study which will enable an informed decision to be made. Budget for review of the PEA report will be communicated to you after you have submitted the PEA reports to the Council for Review. The PEA report should contain among other things, the following information:

i. Description of project characteristics and the affected environment;
ii. Design layout of the charco dam and the canal;
iii. Concerns from relevant stakeholders including Local Government Authority and Water basin Office;
iv. Legal Framework;
v. Identification of Impacts on the local environment;
vi. Assessment of impacts in terms of energy flow, effect on sensitive ecosystems relative to the baseline state and socio-economic impacts;
vii. Environmental and Social Management and Monitoring Plans.

Please, do not hesitate to contact us in case you need additional information or clarification on this process through Tel No. (022) 2125245 or 0784508062

All correspondence should be addressed to the Director - General

Yours Sincerely,

F.C.N.Rugiga
For: Director General

CC Environmental BENCHMARK
P.O.Box 77222, **Dar es Salaam.**

Appendix 2: Officials consulted in Meatu district

Stakeholders' Consultation for Environmental and Social Impacts Assessment for LVEMP II Works for Construction of Mwabuma Charco Dam in Meatu District in Simiyu Region

OFFICIALS CONSULTED

NO.	DATE	NAME	POSITION	MOBILE NO./EMAIL	SIGNATURE
1.	28/06/12	SAMO MSOMOLA	DPLO	0787420102	
2.	28/6/12	EMMANUEL RUGAMILA	DLNRO/DEMO	0753-457520	
3.	29/6/2012	JOHN LUGEMBE	Ag. DWE	0789443513	
4.	29/6/2012	ROMANUS THOMAS	Water lab Tech.	0712-035204	
5.	29/06/12	ROGATEVANE KIPIGAPASI	ECONOMIST	0716 005600	
6.	29/06/2012	ALFRED S. MZURIKWAO	DAS	0786102953	
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					

Appendix 3: Attendance to consultation meeting

MKUTANO WA WADAU WA MRADI WA UJENZI WA LAMBO KATIKA KATA YA MWABUMA WILAYA YA MEATU

MAHUDHURIO

29-06-2012

NA	TAREHE	JINA	MTAA	SAHIHI
1.	29.06.2012	KIDAYI N. NYANDA	S.80 ASB	
2	"	MOSES N. SHOTTO	ICHIMU	
3	"	NZUNBI M. JULIUS	MWANMWINA	
4	"	LEJINA NGOGELA	ICHIMU	
5	"		ICHIMU	
6	"	SOPHET NDONGO	ICHIMU	
7	"	SITTA HANGA	MALWILA	SITA HANGA
8		KINWOLO BENJAMIN	NGWANGWINA	
9	"	NYALUMBI NYABULU	MASANGA	
10	"	LYUBA SHEMBO	MASANGA	
11	"	KUU SALU NONI	MALILO	
12	"	MASELE S/ KANENGO	BEGA	
13	"	EMMANUEL J. ZENGO	ICHIMU	
14	"	LUKINGO BENJAMIN	NGUNA	
15	"	MALILO MUGOMA	NTINA	
16	"	PETRO MABUHU	BULYASULU	
17	"	PETER BENJAMIN	NGWANGWINA	
18	"	BULUDA MASHIBA	NGWANGWINA	
18	"	ESTA MAGALU	ICHIMU	
19	"	KABULA MAYANZA	BULYASULU	
20	"	ESTA MACHENJA	MWAMILYANGE	
21	"	LILU MANGEMBE	MASANGA	
22	"	NHINDILO MATALU	MWANGWINA	

AFISA MTENDAJI
KIJIJI CHA MWABUMA
MEATU

MAHUDHURIO

NA	TAREHE	JINA	MTAA	SAHIHI
23	— " —	DEUS NZALA	IBUMBA	
24	— " —	KINTWILI KIMWESO	MWAMILYANGE	
25	— " —	ICHONA KIBIJE	ICHIM	
26	— " —	KIBIJE KATANI	ICHIM	
27	— " —	WALI M WALI	ICHIM	
28	— " —	MAHAMO MLINGWA	MWANGWINA	
29	— " —	ALLY DANIEL	MALWILO	Daniel
30	— " —	NCHAMBI LALUNI	MALWILO	
31	— " —	LWEYO NONI	MALWILO	LWEYO
32	— " —	KOI[illegible] MIPAWA	ICHIM	
33	— " —	SAKA MINGIYAYI	ICHIM	
34	— " —	MABULA MAKALI	BEGA	Mabula
35	— " —	MABULA NGUMBE	BEGA	M NE
36	— " —	SITA N' SALU	MALWILO	S. Salu
37	— " —	MAJABA SHAULI		M. SHAULI
38	— " —	NKINDA NDEGE	MASANGA	Ndege
39	— " —	BUYA KUHOKA	MASANGA	B. KUHOKA
40	— " —	SAYI MATIBA	IBUMBA	Sayi
41	— " —	KIJA SAYI	IBUMBA	KIJA
42	— " —	MNGELE SAYI	IBUMBA	
43	— " —	JOSEPH BUTENE	IBUMBA	JOSEPH
44	— " —	MSA MAZANGWA	IBUMBA	MSA
45	— " —	HOLO MAGAJAMI	MWANGWINA	Holo

AFISA MTENDAJI
KIJIJI CHA MWABUMA
MEATU

MAHUDHURIO

NA	TAREHE	JINA	MTAA	SAHIHI
46	29/6/2012	HANGI MBITI	MALWILO	H.MBITI
47	-11-	NGOMBE NGHUMBI	ICHIMU	N. NGHUMBI
48	-11-	MAHAMO MACHUNGWA	ICHIMU	[illegible]
49	-11- 29/6/2012	MADUHU LUMBILA	NGHNGWANGWA	M. LUBUMBILA
50	-11-	GATA MATUNYALANYA	NGWANYOLB	G MATULANYA
51	-11-	PENINA HUMO	ICHIMU	P.Humo
52	-11-	MARCO MADUHU	BULYASELE	[illegible]
53	~~NYENYE~~	NYENYE HUMU	ICHIMU	[illegible]
54	-11-	KASWESWE MAKOLO	ICHIMU	[illegible]
55	-11-	MACHIBYA KIMEGG	BUKINGWAMANA	Mkimege
56	-11-	NKINDA CHEYO	MWANYOLE	Nkinda
56	-11-	NGWASI SHENI	IBUMBA	[illegible]
57	-11-	NSAMAKA SALU	MALWILO	[illegible]
58	-11-	SAKA MADUHU	BEGA	S. MADUHU
59	-11-	SANE NKEYA	MASANGA	[illegible]
60	-11-	HABI NDAMA	Mwamhinya	H. N
61	-11-	NGULI DOTO	Malulo	N DOTO
62	-11-	DEUS MAKALI	MALWILO	D. MAKALI
63	-11-	KILUMA MATALU	NGWANGWINA	[illegible]
64	-11-	KISSY MAKOLO	-11-	[illegible]
65	-11-	IKINGI LUGOYE	NGWANGINA	IKINGI
66	-11-	MYATALU MADUHU SAYI	ICHIMU	[illegible]

AFISA MTENDAJI KIJIJI CHA MWABUMA MEATU

Appendix 4: Minutes of Consultation Meeting

MKUTANO WA WADAU WA MRADI WA BWAWA LA
MAJI KIJIJI CHA MWABUMA WILAYANI MEATU
29-06-2012

AGENDA ZA MKUTANO
1. KUFUNGUA MKUTANO
2. MRADI WA LAMBO MWABUMA
3. KUFUNGA MKUTANO

AGENDA NA 1/2012 KUFUNGUA MKUTANO

Mwenyekiti wa Kijiji alisimama kufungua mkutano mnamo mnamo saa 7:00 mchana na kuwaomba wananchi wawe wasikivu na wapesi wa kuchangia hoja

AGENDA NA 2/2012 MRADI WA LAMBO

Katibu wa Mkutano alisimama kusoma agenda hii kwa wananchi na kumuomba mgeni kutoka Mazingira Mwanza kufafanua ajenda hii kwa mradi wa lambo uliobuniwa siku nyingi na kupitisha kilichobaki ni utekelezaji wa kuchimba lambo

Wananchi walichangia hoja na kuomba kwa kijiji hiki ni kikubwa lambo moja. halitoshi kunywesha mifugo inatakiwa kuongeza malambo yawe malambo matatu(3)

Wananchi waliomba ufugaji wa samaki - malambo yawe na makalo ya kunywesha - mifugo ili kuepusha msongamano wa mifugo kwakuzingatia mifugo walikua wanapata maji mto Simiyu sehemu nyingi

P.T.O

Mwezeshaji Alisema athari ambazo -
zinaweza kujitokeza kwenye lambo wakati
kuogelea vinyesi. Kila kaya zichimbe
vyoo na kuvitumia ili kuepuka Milipuko
ya magonjwa kama vile kupindu pindu
kuchocho taifodi nk.
lambo hilo litajengwa ni la wananchi wa Mwabuma
ni mali ya wanakijiji lamba hili linatakiwa
kutunzwa na kutumiwa vizuri ili lisije
likaleta athari kwa wananchi kwanjumla
Mabwawa yana saidia sana maisha ya binadamu
na mifugo ni bora kutunzwa vile vile
kuzuia mmomyoko wa ardhi hususani
maeneo ya mtiririko wa maji kupeka
kwenye lambo ili lisije likajaa tope
kina kinakua kufupi hatimaye kukaacha lambo
lina kosa maji
wananchi wamesisitiza kuogezewa mabwawa.
bwawa moja kijiji cha mwabuma halitoshi
pia wameomba kuchimbiwa choo cha kujisaidia
pindi wanapoenda kunyevesha mifugo kwenye
lambo. Mwenyeviti wa vitongoji wahakikishe
she kila kaya ina choo na bafu na -
kuvitumia. bwawa hili ni faida
ya wanakijiji cha mwabuma wanatakiwa
kulitunza na kulilinda.
kuongo mtoni ni aibu kwahiyo ni-
marufuku kuogea mtoni na kufulia mtoni

Kilimo Kandokando na mto ni marufuku Sheria ya utunzaji mazingira zifatwe Mita sitini kutoka kingo za mto Simiyu watu wasiendeshe kilimo. Wananchi waliomba wawe makini pindi wanapoibua na kupitisha miradi. Wananchi waliomba kufukia - makolongo ili kuzuia mmomonyoko wa ardhi Wananchi kwaujumla walikubaliana na mada zote zilizotolewa na watoa mada Waliomba lambo lichimbwe mapema kabla ya mvua haijaanza kunyesha

AGENDA NA 03/2012 KUFUNGA MKUTANO

Mwenyekiti alisimama kufunga mkutano mnamo saa 10:00 jioni kwakuwashukuru wageni kutoka wilaya watoa mada pamoja na wananchi waliohudhuria mkutano na wepesi wa kuchangia hoja zao ndani ya mkutano

MWENYEKITI
[signature]

KATIBU
[signature]
AFISA MTENDAJI
KIJIJI CHA MWABUMA
MEATU.

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

S/N	ITEM	ACTION
1.0	**GENERAL COMMENTS**	
i.	Indicate how the proponent will comply with all laws provided in the PEA report.	Proponent compliance with the laws is shown under Chapter 3.
ii.	Page numbering should be revised, start with Roman numbers, then from introduction start with Arabic numbers.	Numbering revised to show roman numerals on preliminary issues of the report.
iii.	Charco has been repeatedly written in lower case, since this is the name should start with capital letters.	All replacements have been done.
iv.	On the cover page, the e-mail address should be secretarydg@nemc.or.tz and dg@nemc.or.tz	Email address indicated on the report cover page
2.0	**SPECIFIC COMMENTS:**	
i.	Page 22, enlarge figure 2 and ensure coordinates are visible.	Figure 2 enlarged and now legible
ii.	The executive summary is too long, write it better by highlighting key issues e.g. introducing the project, the major findings and conclusion. Avoid summarising every section. Also the matrices in the executive summary should be removed to the main text.	Summarized and made according to the requirements of regulation regulation 18 (3) (d)
iii.	Figure 2.2, the figure has no coordinates, legend, North arrow and scale bar	All map essentials presented and it is now figure 2 .
iv.	On page 2, the signature of Eng. Sanjo Mgeta is missing.	Now included
v.	Page 5, the list of tables should be on the new page..	Effected as required
vi.	Page 9, the matrix should be moved to the main text.	Moved to main text
vii.	Page 13, sect, 11 the title should be summary and conclusion. No recommendations are needed in the section. Rephase them and put into mitigation measures if applicable.	Re-written as required.

viii.	Page 15 an acknowledgement should be written by the proponent.	Done accordingly.
ix.	Page 17, figure 1 the map needs to be prepared professionally, North arrow, scale bar and other key map elements are needed.	Map essentials are included presented. Maps are prepared to meet a certain specific purpose as is the case in this figure. It was only meant to show where the project site is located in the Lake Victoria basin
x.	Page 22, figure 2 the map is missing north arrow, the legend is not visible.	Enlarged and the map elements are visible.
xi.	There is no detail design of the weir intake page 25.	Detailed designs are not completed. Existing designs are for the sake of PEA and an input to the final design
xii.	On page 26, the designed embankment top level of 1335.000m is too high from the expected full supply level and to the spill way therefore the embankment height should be increased by 0.8m above the ground level.	Designers are informed of the recommendations
xiii.	The soil profile around the reservoir is not indicated in the PEA report. It does not show if the soil below can hold water (impervious soil) see page 26 fig. 4.	Studies and area history which are not part of this report show that the soil is impervious.
xiv.	The layout plan does not show clear information from the intake to the reservoir (e.g. canal length, wear width and the River to be blocked) see page 26.	Final designs are not completed, but for the sake of PEA, preliminary designs were provided to enable decision making.
xv.	Page 44 section 4.2.1, the last paragraph is not written by the professional it convey false wrong message.	Re-written and conveys understood information.
xvi.	Page 54, sect. 5.1 needs to be revised so that it match with its title under Sect. 5, this section should be stakeholders consultation and carry the content on consultation.	The section was re-casted.
xvii.	Page 54, section 5.2 should be public involvement. The content under this section should match with its title.	Done.

xviii.	Page 60, the impacts and mitigation measures should be presented in matrix.	According to the information available, presentation in matrix form won't be favourable.
xix.	. Page 72, should be in the table other diseases as listed in the text such as malaria, typhoid and others.	Incorporated.
xx.	Page 85, section 11 the title should be Summary and Conclusion, delete the recommendations.	Done.
xxi.	. According to the proposed designed reservoir the title should be changed to be a Dyke and not a Charco dam as indicated in the top cover.	The project name cannot be renamed. It is not a Dyke; it was misapprehended by the reviewer.
xxii.	. The indicated embankment filling of 5, 1562,878m^3 in not correct and should be re-calculated.	Designers are responsible for that, and they are working on this fact.
xxiii.	Page 78, table 13 should insert the Colum of impacts before parameters.	Refer to chapter 6 for impacts, parameters were drawn from impacts.
xxiv.	. Page 78, the 2nd column (indicator-mitigation target need to be rephrased and sharpened. The plan should have activities to be implemented.	Done accordingly.
xxv.	Page 78, the responsible person should be the proponent.	Incorporated. The villagers will manage the activities under supervision of the ministry of water.
xxvi.	Page 9, sect. 5 should present the main findings from stakeholders consultation.	Presented.