

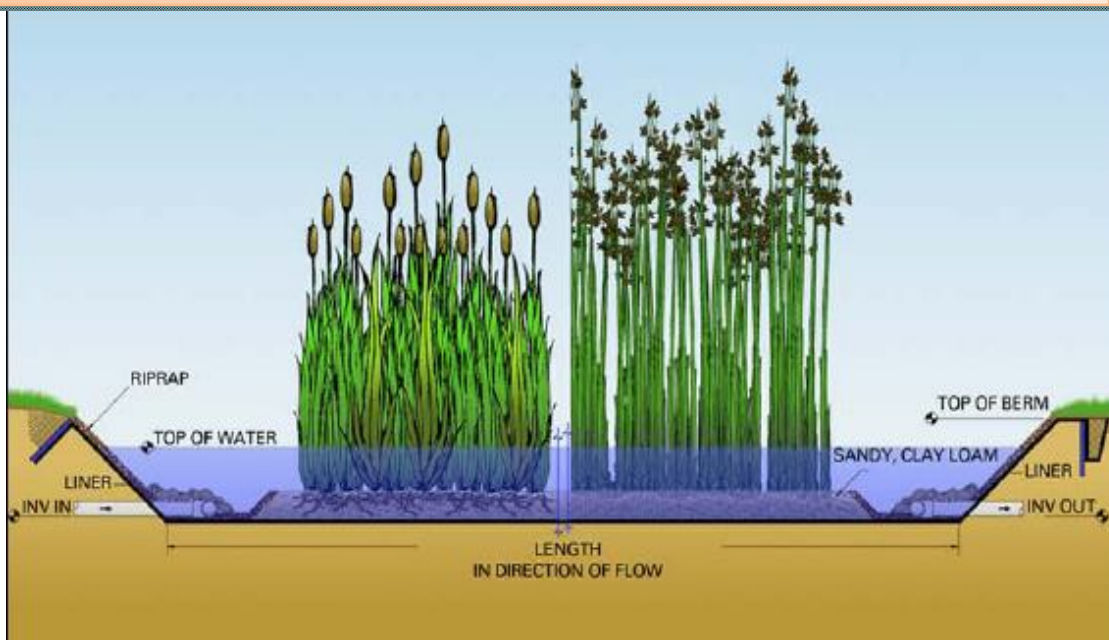


## Ministry of Water

### Lake Victoria Environmental Management Project (LVEMP II)

P. O. Box 9153, Dar es Salaam, Tanzania

## Preliminary Environmental Assessment for the Proposed Construction of Artificial Wetland at Butuja Sub-Ward in Ilemela Ward located in Mwanza City



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## Preliminary Environmental Impacts Assessment for Proposed Construction of Artificial Wetland at Butuja Sub-Ward in Ilemela Ward located in Mwanza City

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## Executive Summary

### Introduction

Lake Victoria is the second largest freshwater lake in the world with a surface area of about 68,000 km<sup>2</sup> shared by Kenya Uganda and Tanzania. Its catchment area is about 197,500 km<sup>2</sup>, extending to Republics of Rwanda and Burundi as well, with a population of more than 30 million people living in the basin. This is the largest inland water and fishery sanctuary in East Africa, with an estimate annual fish catch of about 750,000 metric tonnes and an inland water transport linkage for the three East African states. Furthermore, the lake is a major reservoir and source of water for various purposes. The lake also is a repository for both treated and untreated wastes.

Over the years, the lake has suffered from increasing pollution as the result of expansion of development activities and an ever increasing population growth in the basin. As part of many initiatives to control further deterioration of the Lake, Lake Victoria Environmental Management Project (LVEMP) Phase I activities were planned and implemented around Lake Victoria ending up in December 2005. Later in 2009, LVEMP II was initiated 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).

During the first phase it was revealed that municipal and industrial effluent discharged into the lake from most wastewater treatment plants and industrial plants neither meet local nor international water quality standards. In efforts to reduce pollution, the Mwanza city's wastewater treatment plant at Butuja was rehabilitated to improve treatment capacity where it was noted that the treatment efficiency of the treatment plant is not satisfactory and that it is continuing to pollute the lake.

In order to tackle this problem, artificial wetlands for polishing of the effluents from the existing treatment ponds was proposed as one of the strategy to reduce environmental pollution in the Lake. The Ministry of Water commissioned M/s Environmental BENCHMARK, Consulting Civil-Environmental Engineers of Dar es Salaam, to carry out an environmental impact assessment before the project implemented. Registration of the project with the National Environment Management Council (NEMC) was carried and NEMC's screening decision instructed the proponent to undertake the Preliminary Environmental Assessment study.

### Project Description

The proposed wetland is envisaged to be constructed in Mwanza City in Butuja sub ward in Ilemela ward in Ilemela District. The wetland is envisaged to be constructed downstream side of the existing waste stabilization ponds.

The type of wetland will be either Free Water Surface (FWS) wetland which consists of a basin or channels with some type of barrier to prevent seepage, soil to support the roots of the emergent vegetation, water at a relatively shallow depth flowing through the system and the water surface exposed to the atmosphere or the Subsurface Flow (SSF) type which makes use of the same removal mechanisms as FWS wetland and involves sedimentation, filtration and microbiological degradation.



## **Policy, Administrative and Legal Frameworks**

Relevant policies and legislations pertaining to development of artificial wetland mainly environmental management in terms of quality, health and safety, pollution of ground and surface water, pollution of soil, land and land use control, ecosystem, 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 these 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 World Bank 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.

## **Baseline Conditions**

### **Physical Environment**

The Mwanza city is characterised by isolated hills and rocks at altitude of between 1100-1600 metres. It is also characterised by well-drained sandy loamy soil generated from coarse grained cretaceous. It experiences between 700mm and 1000mm of rainfall per annum. The mean temperature ranges between 25.7°C and 30.2°C in hot season and 15.4°C and 18.6°C in the cooler months. Observations on flora and fauna in particular threatened/endangered/endemic species discovered that no potential species in these lists will be lost as the land is continuously used for small scale agriculture, settlement linked to fishing.

Ilemela ward has the population of 28,444 people, with 11,388 males, 12,476 females and 4,580 children. The residents of the project area, Butuja sub ward engage in fishing and small scale cultivation of paddy, sweet potatoes, maize, sorghum and vegetables.

### **Social Services**

Lake Victoria is the main source of water for the city. Other sources include rivers, and springs and ground water especially in peri-urban areas such as in Buhongwa ward. The water sources, storage and distribution facilities have adequate capacity to meet existing demand of 65,000 m<sup>3</sup> per day but pumping capacity is only 42,000 m<sup>3</sup> per day. Water quality is also becoming a matter for serious concern due to the declining quality of the Lake Victoria environment. The residents at the proposed area use water drawn directly from the lake.

Mwanza city has 105 health facilities including 6 hospitals, 10 health centres, 87 dispensaries and 2 clinics. Two of the hospitals, three health centres and 24 dispensaries are government facilities while the rest are private. Malaria is the leading disease affecting the majority of the population of all age groups. Butuja area poses a unique scenario since the area is preserved for liquid waste disposal but people are still living in the area. There are series of cholera outbreaks, in 2010 cholera claimed 7 lives.

According to the comprehensive council health plan for Mwanza City 2010/2011 the current HIV/AIDS prevalence is 5.6% of the population. HIV/AIDS Committees have been initiated and more than 14,201 have obtained counselling and testing services at 17 Voluntary Counselling and Testing Centres in the city in 2011. The number of orphans is increasing rapidly in the city.

Mwanza City has 863 km of roads of which 75% are unpaved. Plans are underway to use stones for road paving to reduce costs. The City Council has acquired a stone cutting

machine for the purpose. In the study area, there are only footpaths from the residents towards the lake, but there is a nearby road, Makongoro road which links the city to the international airport.

On solid waste, Mwanza city generates about 385 tons of domestic waste and about 500 tons of industrial refuse per day. The capacity of the council is limited to 5 refuse trucks, 4 side loaders, 2 wheel loaders, 1 skip loader and 25 skip buckets. About 45% of the solid waste is collected by CBOs and a private company. Solid waste is disposed at the Buhongwa dumpsite, 18 km from the city centre.

As far as the Liquid Waste is concerned, shallow pit latrines are common and overflow during heavy rains, releasing faecal matter into waterways leading to the lake. Most households that use septic tanks discharge waste water from kitchens and bathrooms into storm water drains. There is the sewerage system in the City which is connected to Butuja waste stabilization ponds. Relatively, the people connected to the sewer are few and properties in Butuja sub-ward are not connected to the sewer.

### **Stakeholders' Consultation**

The consultation activities involved all necessary potential Interested and Affected Parties. The comments received and issues raised from these exercises have been incorporated into the Preliminary Environmental Assessment report and used in determining mitigation measures for the project. The public meeting at Butuja was communicated to the community on 21<sup>st</sup> June 2012 and, the meeting was held at on 24<sup>th</sup> June 2012 to discuss the proposed wetland.

The main issue and concern of almost all residents of Butuja is to be relocated and paid the compensation as the area they are living in has all sorts of nuisances from waste stabilization ponds. The area proposed for wetland construction is very useful for economic issues especially for fishing, small scale cultivation and light settlement.

### **Perceived negative impacts of the project**

- Loss of farming plots (proposed wetland area).
- Unnecessary delay of compensation and that few people have been compensated while majority have not received anything.
- Odour problems –inadequately treated wastewater produces obnoxious smell that become a nuisance to the people.
- Destruction and removal of residential houses without compensation (During resettlement assessment/ valuation there were 198 households in 2002, but now there are more than 600 households)
- Increased water borne and other water related diseases like typhoid, diarrhoea, malaria etc.

### **Identified Impacts and Mitigation Measures**

The possible positive impacts which will result from the implementation of the project include:

- Improvement in health and sanitation through discharge of well treated water that meets effluent quality standards;
- Reduction of contamination of existing water resources;
- Temporary employment
- Reduction of water related diseases resulting from good lake water,

- Creation of new businesses at the construction site

### **Negative Impacts of the Project**

Many impacts were identified and respective mitigation measures were proposed. These negative impacts are land loss, relocation of people, loss of vegetation, generation of solid wastes, land scarring from cut and fill materials, soil erosion, soil contamination during construction, dust generation and air pollution during construction, noise pollution during construction, contamination of water such as from leakages of fuels and lubricants from the construction equipments, poor health and safety, child labour, disturbance to people going for fishing, fetching water and farms, nuisance to workers due to smell from the WSPs, odour from the wetland and risk to life of nearby people.

Respective mitigation measures are provided in the report, for example effecting compensation to all Project Affected Persons as early as possible, limit clearance of vegetation to 6 ha, site keeping to minimize waste generated from such works, all solid wastes will be collected and transported to Buhongwa disposal site, assigning contractor's environmental or safety officer the responsibility to ensure that the surroundings are kept clean, implementation of erosion control measures, use of vehicles which are in sound conditions i.e. those without fuel and oil leakage, good selection of vehicle routes in order to avoid passing through agricultural fields, water sprinkling, dust masks and goggles by operators and those working in dusty areas, where the noise level is beyond 85 dB(A) then ear morphs or plugs shall be provided to all those either operating or working within the construction site, to reduce the spread of STDs and HIV/AIDS there will be workers sensitization programs for workers and local community, Human settlements should be far away from the wetland in such a way as to avoid nuisance resulting from obnoxious smell, proper wetland design with permanent fencing material to control children from entering the wetland. In case the subsurface flow (SSF) Wetland is adopted then the risks associated with breeding sites for mosquitoes and other disease vectors will be minimized and reduce ideal environment for breeding sites for mosquitoes and other disease vectors.

### **Project Alternatives**

The EIA procedure requires that an environmental investigation identify main project alternatives for any proposed development. On assessment of the project locations, several options were analysed and finally the Consultant recommended that the construction of the proposed wetland on the preferred proposed site 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.

### **Environmental and Social Management Plan**

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

Environmental Impact Assessment for any development project is administered and approved by the Vice Presidents' Office, where the Minister for Environment falls. Therefore for environmental assessments for the proposed project, the responsible institutions are the 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 Consultant and other experts from Mwanza City Council. To minimize potential environmental and social negative impacts, the project will require the support of various institutions in the project area as presented in the main report.

### **Reporting Arrangement of the EMP**

Environmental Representative from Ilemela District Council to deal with Environmental Management will cooperate with other experts such as District Land Officers, District Valuers and Community Development Officers or City Officers to provide the Regional Environmental Management Expert with environmental reports 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.

### **Environmental and Social Monitoring Plan**

Monitoring is the long-term process that normally begins at the start of the project and 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 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.

### **Summary and Conclusion**

The Preliminary Environmental Assessment (PEA) study for Butuja artificial wetland has been completed by describing the project characteristics and identifying impacts and proposing corresponding mitigation measures. The project proponent and other beneficiaries are eagerly waiting for a decision from NEMC. If NEMC is satisfied that the wetland project shall not have significant negative impacts on the environment and the community, or that the information provided in this report discloses sufficient mitigation measures, it may proceed to recommend to the Minister to approve the project so that subsequent project activities may continue.

This project is essential for the residents of Mwanza city as they expect benefits from improved sewerage services and therefore expect quality improvement of the lake water as some of them utilize water from the lake without treatment.

Most of the project negative impacts can be mitigated to the acceptable level using the proposed mitigation measures. Constant involvement of all parties including the proponent, Contractor and Mwanza City Council authorities, as well as Butuja sub ward government authorities in the project will be required to implement and monitor the mitigation measures.

The persons in the proposed area will be compensated mainly those who are not yet paid, followed by relocation from the area in order to pave the way for the works. Valuation of properties was done in 2002, when there were only 198 households at but currently there are about 600 households (according to information from the public meeting at Butuja), it means there are other PAPs who got into the area later taking advantage of the low profile the project took. Also those who were compensated might have decided to sell the properties to

new comers who were not aware of the development. This gap needs to be bridged for the betterment of the proposed project

Monitoring of environmental and social impacts is important in ensuring sustainable operation of the wetlands. Among the significant environmental challenges that will result from the wetland operation is maintenance. Proper maintenance will result to proper wastewater treatment.

## **Acknowledgements**

A number of individuals made this study possible through their commitment in terms of time and effort. The Ministry of Water through LVEMP II is grateful to all those who contributed in one way or another to this assessment in particular Environmental Engineer Sanjo Mgeta, sociologists Mr. Huruma Kisaka and Ms. Haikael Mpangavo and assistant environmental assessment expert, GEng. Weisiko M. Magoto and the team driver, Mr. Ladslaus K. Mayowa.

LVEMP II, the project proponent is as well grateful to Mwanza City authorities for their support during the study. The proponent is also greatly indebted to the residents of Butuja sub-ward for their time to participate in public meeting as part of consultation process and providing immeasurable input into this work. The support of various staffs from different government institutions, design consultants, non-governmental organizations, who at different stages of the study were involved in supplying relevant information to the study team, is highly appreciated.

## List of Acronyms and Abbreviations

AMREF	African Medical Research Foundation
ARV	Anti Retro Viral
BOD	Biochemical Oxygen Demand
CAP. 191	Chapter 191 as it appears in the Environmental Management Act No 20 of 2004.
CBO	Community Based Organisations
CCDO	City Community Development Officer
CITES	Convention on International Trade and Endangered Species of Wild Fauna and Flora
CPLO	City Planning Officer
DEMO	District Environmental Management Officer
DLO	District Land Officer
DO	Dissolved Oxygen
DO	Dissolved Oxygen
EAC	East Africa Community
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
FHI	Family Health International
FWS	Free Water Surface
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GTZ	German Agency for International Cooperation deduced from <b><i>Deutsche Gesellschaft für Internationale Zusammenarbeit</i></b>
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome
HSE	Health, Safety and Environment
I&APS	Interested and Affected Parties
ICT	Information and Communication Technology
IEC	Information Education and communication
IGA	Income Generating Activities
LT	Long Term
LVB	Lake Victoria Basin
LVBC	Lake Victoria Basin Commission
LVEMP I	Lake Victoria Environmental Management Project Phase One
LVEMP II	Lake Victoria Environmental Management Project Phase Two
MEAS	Multilateral Environmental Agreements
MKUKUTA	Swahili version of the National Strategy for Growth and Reduction of Poverty
MT	Medium Term
MWAUWASA	Mwanza Urban Water and Sewerage Authority
N	Nitrogen
NAWAPO	National Water Policy
NEMC	National Environment Management Council
NEP	National Environment Policy
NGO	Non-Governmental Organization
NLUC	National Land Use Commission
OP/BP	Operational Policy/ Best Practice of the World Bank
OSHA	Occupational Health and Safety Authority

OSHA	Occupational Safety and Health Authority
P	Phosphorus
PEA	Preliminary Environmental Assessment
PLHAS	People Living with HIV/AIDs
PPE	Personal Protective Equipment
R.E.	Revised Edition
REME	Regional Environmental Management Expert
RPCT	Regional Project Coordination Team
SIDA	Swedish International Development Agency
SSF	Subsurface Flow
ST	Short Term
STDs	Sexually Transmitted Diseases
STDs	Sexually Transmitted Diseases
TACAIDS	Tanzania Commission of AIDS
TACAIDS	Tanzania Commission for AIDS
TN	Total Nitrogen
TP	Total Phosphorus
USD	United States Dollars
VP	Vice President
VTCs	Vocational Training Centres
WDC	Ward Development Council
WDC	Ward Development Committee
WSPs	Waste Stabilization Ponds



# 1. Introduction

## 1.1 Project Background and Justification

Lake Victoria is the second largest freshwater Lake in the world with a surface area of about 68,000 km<sup>2</sup> shared in the proportions of 6%, 43% and 51% by Kenya, Uganda and Tanzania respectively. Its catchment area is about 197,500 km<sup>2</sup>, extending to Republics of Rwanda and Burundi as well, with a population of more than 30 million people living in the basin. This is the largest inland water and fishery sanctuary in East Africa, with an estimate annual fish catch of about 750,000 metric tonnes and an inland water transport linkage for the three East African states. Furthermore, the lake is a major reservoir and source of water for domestic, industrial, hydropower production and commercial purposes. The lake also is a repository for both treated and untreated wastes generated from various activities in the basin, some of which can alternatively be reused for valuable activities such as agriculture.

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

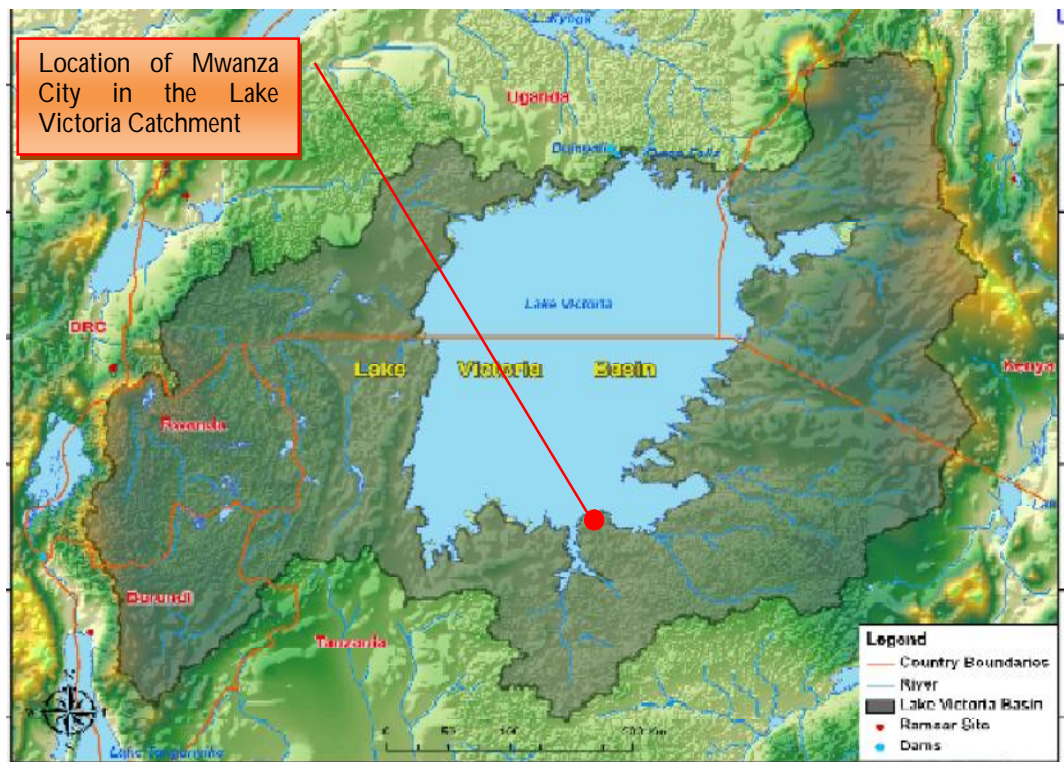


Figure 1: Lake Victoria Basin

As part of many initiatives to control further deterioration of the Lake, LVEMP I activities were planned and implemented around Lake Victoria. The first phase ended in December 2005. Later in 2009, Lake Victoria Environmental Management Project Phase Two (LVEMP II) was initiated 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).

This second phase is equally a regional initiative and a multi-sectoral approach on the management of the Lake Victoria Basin implemented in the five East African Community (EAC) Partner States, Burundi, Kenya, Rwanda, Tanzania and Uganda. Lake Victoria Basin Commission (LVBC) coordinates the project regionally through the Regional Project Coordination Team (RPCT) based in Kisumu, Kenya. The Ministry of Water is the Focal

Point Ministry on the Tanzanian side. In Tanzania, the project became effective on 20th August 2009, covering a total of 23 districts in Mara, Shinyanga, Mwanza and Kagera Regions. The Project is funded by the World Bank, Global Environmental Facility (GEF), Swedish International Development Agency (SIDA), Government of Tanzania and Communities.

During LVEMP I, it was observed that many rivers and streams flowing into Lake Victoria and the near-shore areas are heavily polluted, particularly by;

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

These pollutants bring into the lake, coliforms of faecal origin; oxygen demanding organic substances; heavy metals, such as chromium, lead and mercury and pesticide residues. The increased inflow of nutrients, particularly N and P, has resulted in changing the lake chemical and bio-physical characteristics, increased eutrophication<sup>1</sup>; nutrients balance problems, health problems to riparian communities, and proliferation of water hyacinth.

It was further revealed that municipal and industrial effluent discharges from most wastewater treatment plants and industrial plants neither meet local nor international water quality standards. It is currently estimated that municipalities contributes to the Lake the following pollution loads: BOD 17,940, TN 3,510 and TP 1,620 tons/year.

The LVEMP II therefore intends to support Mwanza Urban Water and Sewerage Authority (MWAUWASA) in developing facilities for disposal of wastewater in an environmentally friendly manner by constructing an artificial wetland to be located downstream of the existing waste stabilization ponds in order to improve the effluent quality.

It is from this observation and other similar problems to various pollution sources that LVEMP II has set its sub-project objectives and key outputs targets at reducing pollution into the lake by reducing discharge of untreated effluent from municipal waste by supporting public investments, including:

- i. rehabilitating and improving selected wastewater treatment facilities to reduce discharge of untreated effluents into the lake,
- ii. connecting primary treated effluent discharge to constructed/restored wetlands; and
- iii. providing on-site sanitation facilities.

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

Currently, only Mwanza city is served with the central sewerage system among the three major urban centres (others being Bukoba and Musoma) along Lake Victoria on the Tanzanian side. The Mwanza city’s wastewater treatment plant at Butuja has been rehabilitated recently to improve treatment capacity. The system now comprises of inlet works, cess pit emptier discharge facilities, anaerobic ponds (3 cells), facultative ponds (4

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<sup>1</sup> Eutrophication is the process by which a body of water becomes enriched with excess dissolved nutrients (such as nitrogen and phosphorus) that stimulate the growth of aquatic plant life, usually resulting in the depletion of dissolved oxygen

cells) and maturation ponds (6 cells). The treatment plant also has sludge drying beds for sludge treatment from cess pit emptier discharge and anaerobic ponds when disludged. It is suspected that nutrients and BOD removal from the treatment plant is not satisfactory and that it is continuing to pollute the lake downstream of the waste stabilization ponds.

In order to reduce the level of pollutants into the Lake, LVEMP II proposed construction of an artificial wetland for polishing of the effluents from WSPs as one of the strategy to reduce environmental pollution in the Lake.

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

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

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

## **1.2 Purpose of Undertaking Preliminary Environmental Assessment**

The principal objectives of undertaking preliminary environmental assessment study are to investigate and identify the most significant environmental and social impacts and address socio-economic issues likely to emanate from the construction and subsequent operation of the Butuja artificial wetland. The report is aimed at helping NEMC in making an informed decision. If NEMC finds that the project shall not have significant negative impacts on the environment, or that the information provided in the report discloses sufficient mitigation measures, it may proceed to recommend to the Minister to approve the project. Where NEMC finds that the project shall have significant impact on the environment and that the project report discloses no sufficient mitigation measures, it shall require the proponent to undertake a full environmental impact assessment.

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

- Improving the understanding of the local communities in identification, assessment or evaluation of the significance of the impacts of the wetland 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 study include literature reviews, consultative meetings with Mwanza city officials, Butuja sub-ward leaders and visual observations through physical walking in the project areas. Thus the following approaches/techniques were used in data collection.

#### **In-depth discussions with key informants**

In-depth discussions with key informants such as Butuja sub-ward leaders, Mwanza city officials and other influential people in the project area were conducted.

#### **Public Consultative meetings**

Public meetings were held with Butuja sub-ward members whereby issues related to construction of artificial wetland were raised as indicated in the section of Public Involvements.

#### **Visual observation**

Observation was made through transects walks. The consultants observed among other things activities carried out in the proposed area such as fishing, cultivation, settlement patterns and other socio-economic activities.

#### **Literature review**

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

## 2. Project Description

### 2.1 Objective of the project

The overall objective of LVEMP II is to contribute to achieve 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”. In details, the project objectives include:

- ✚ Improving collaborative management of the trans-boundary natural resources of Lake Victoria Basin (LVB) for the shared benefits of the EAC partners’ states
- ✚ Reducing environmental stress in targeted pollution hotspots and selected degraded sub catchment and
- ✚ Improving the livelihoods of communities who depend on the natural resources of LVB.

Specifically, the construction of artificial wetland at Butuja aims at improving the effluent quality (i.e. polishing) through uptake of remnant pollutants such as phosphorus, nitrogen and BOD after receiving major treatment works in the Waste Stabilization Ponds (WSP).

### 2.2 Project location

The proposed project for construction of artificial wetlands is envisaged to be placed in Mwanza region as shown on the administrative map of Tanzania in Figure 2. Mwanza City is located on the southern shores of Lake Victoria in northwest Tanzania. On the north it is bordered by Lake Victoria and Ukerewe district, Misungwi district to the south, Sengerema district to the West, and Magu District to the East. It is situated between latitudes 2° 15 south to 2° 45 just South of the equator and between longitudes 32° 45’ – 33.00° east. The City lies at an altitude of 1,140 metres above the sea level. It covers an area of 1324 km<sup>2</sup>, out of these, 424 km<sup>2</sup> (32%) is dry a land and 900 km<sup>2</sup> (68%) is covered by water.

Specifically, the study area is located in Butuja sub-ward in Ilemela ward in Ilemela District. Ilemela district is located on the southern part of Lake Victoria. It is bordered by Lake Victoria, Magu district and Nyamagana district to the west, east and south respectively. The district lies between latitude 2°15’ and 2°31’ south of the Equator, and between Longitude 32° 45’ and 33° east of Greenwich. The total coverage area of Ilemela district is 1080.55 km<sup>2</sup> of which 828.45 km<sup>2</sup> (76.7%) is covered by water and 252.10 km<sup>2</sup> (23.3%) is a dry land.



Figure 2: Administrative map of Tanzania showing Mwanza Region where the project is proposed to be implemented

To a finer detail, the proposed artificial wetland will be constructed downstream of the existing waste stabilization ponds or around the existing ponds located in Butuja sub ward, Ilemela ward in Mwanza City along Makongoro road as indicated on the shaded satellite image below.



Figure 3: Satellite image showing the earmarked project area in light green shading

## 2.3 Accessibility

Accessibility to the sub project site is mainly through Makongoro road which links Mwanza city centre and Mwanza International Airport. The site is located in Ilemela ward, which is situated almost half way from the city centre to the airport.

## 2.4 Project Activities

Constructed or artificial wetlands are made to receive secondary effluents and function as effluent polishing processes. Therefore the project activities are presented in different phases to achieve their intended functions.

### 2.4.1 Mobilization phase

The main activity before commencement of construction works will be effecting compensation followed by relocation of people to pave the way for construction of the artificial wetlands. The process to facilitate compensation has already been initiated and so far

### 2.4.2 Construction Phase;

During the construction phase, among others the activities to be performed include:

- Upgrading the access road to site for supporting heavy machinery
- Fencing the site to isolate unwanted activities in the project area
- Clearing of the land
- Dredging of the land
- Excavation and levelling of the area according to engineering design

- Construction of inlet and outlet structures such as open-end pipe, channel or gated pipe, surface and subsurface manifold and weirs.
- Filling the wetland area with the selected filter material Construction of embankment wall for the wetland
- Establishment of vegetation in the wetlands; and
- Connection of wetland to the exiting waste stabilization ponds

### **2.4.3 Operation Phase**

Operation phase of the constructed wetland refers to waste water treatment (polishing) and maintenance of the constructed wetlands. Effluent from the waste stabilization ponds will be allowed to enter the wetland for treatment through settling of suspended particulate matter, breakdown and transformation of pollutants by microorganisms and plants and subsequent removal of nutrients. The main activity of the developer during the operation phase will be maintenance of the wetland by

- cleaning and maintaining inlet and outlet structures
- inspecting embankments and structures for damage
- monitoring accumulation of sediments
- scheduling discharges from the wetlands
- Maintaining the growth of vegetation in the wetland

### **2.4.4 Decommissioning Phase**

Wastewater treatment is a continuous process and as far as wastewater is continuously generated, there will always be a need for wetlands. In view of this, decommissioning of the project is not seen as significant because all efforts will be geared towards prolonged life of the wetlands. Instead of planning for decommissioning the wetlands, strict plans will be made for maintaining the structures to have prolonged life and better performance in order to reduce environmental pollution.

## **2.5 Design of the Project**

The designer has proposed two alternatives of design for the proposed project for wetland construction. The two options are Free Water Surface Wetland (FWS) and Subsurface Flow Wetland (SSF).

The first option, the Free Water Surface wetland (FWS), typically consists of a basin or channels with some type of barrier to prevent seepage, soil to support the roots of the emergent vegetation, and water at a relatively shallow depth flowing through the system. The water surface is exposed to the atmosphere, and the intended flow path through the system is horizontal.

The second and last option, the Subsurface Flow (SSF) type wetlands, makes use of the same removal mechanisms as FWS wetland which involves sedimentation, filtration and microbiological degradation. However, since the wastewater flow is below the surface, it is in continuous contact with the filter media, which in turn provides more surface area for bacterial growth, therefore allowing for higher organic loading rates. The subsurface flow (SSF) wetland also consists of a basin or channel with a barrier to prevent seepage, but the bed contains a suitable depth of porous media. Rock or gravel is the most commonly used media types. The media also support the root structure of the emergent vegetation. The design of these systems assumes that the water level in the bed will remain below the top of the rock or gravel media. The flow path through the operational systems is horizontal or vertical.



According to the designer, the SSF wetland, because of the higher reaction rates for BOD and nitrogen removal, will require a smaller total surface area than a FWS wetland designed for comparable effluent goals.

However, the process of doing environmental impacts assessment study is not highly dependent on the type of design of the wetland among the two options mentioned i.e. which one will finally be concluded. This is because the proposed two design options vary only in the wastewater treatment mechanisms. Thus, the environmental and social impacts will not significantly vary. The layouts for the designs options are shown in Figure 4.

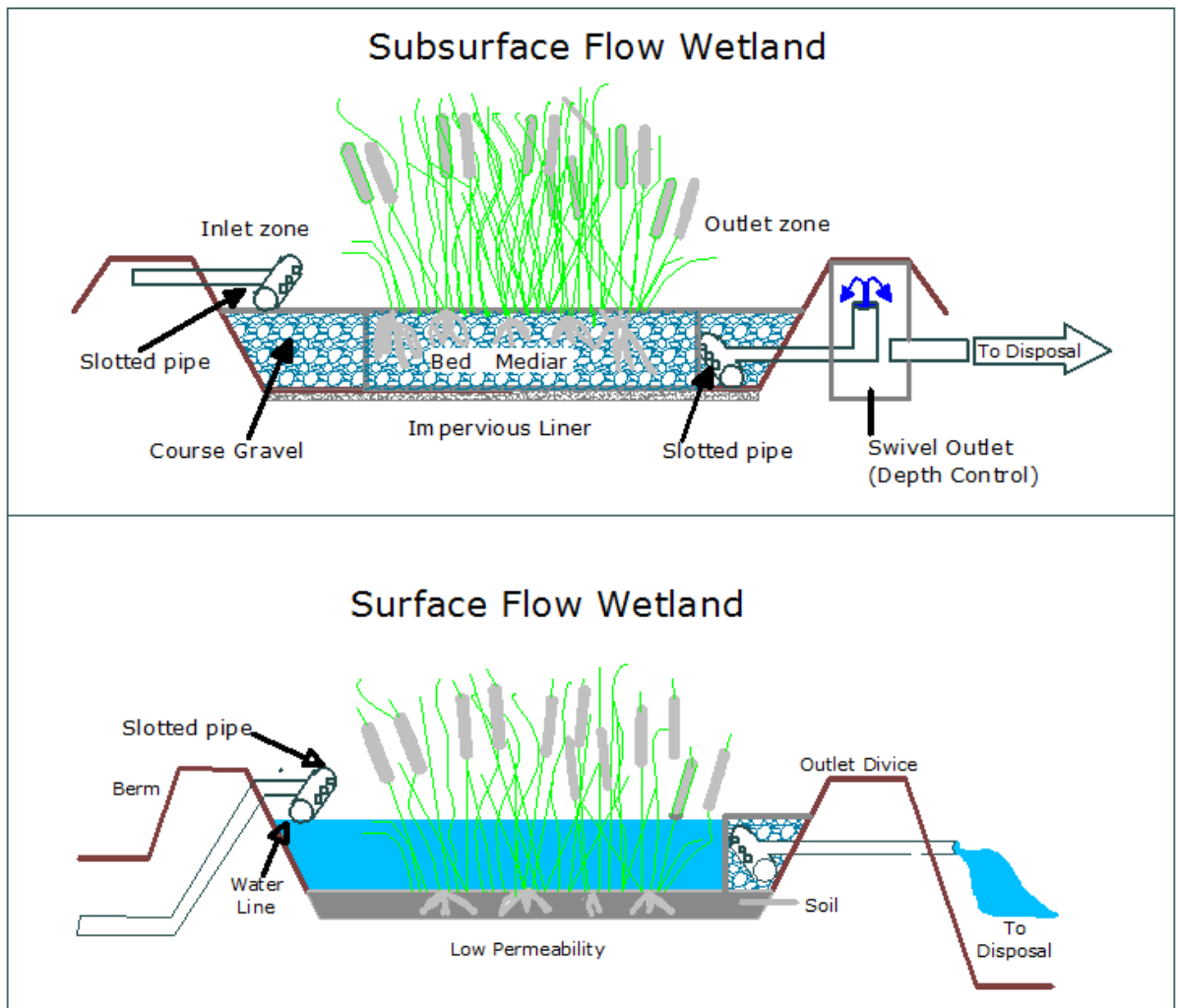


Figure 4: Preliminary design plans

EXISTING ILEMELA PONDS SITE PLAN SITE PLAN CONTOURS AND EXISTING FEATURES



Figure 5: The surveyed land (green coloured) near the WSP

The surveyed area which is required and available for construction of the wetland is approximately 13 ha excluding the Lake Victoria buffer zone, but, initially only 6 ha are estimated to be used.

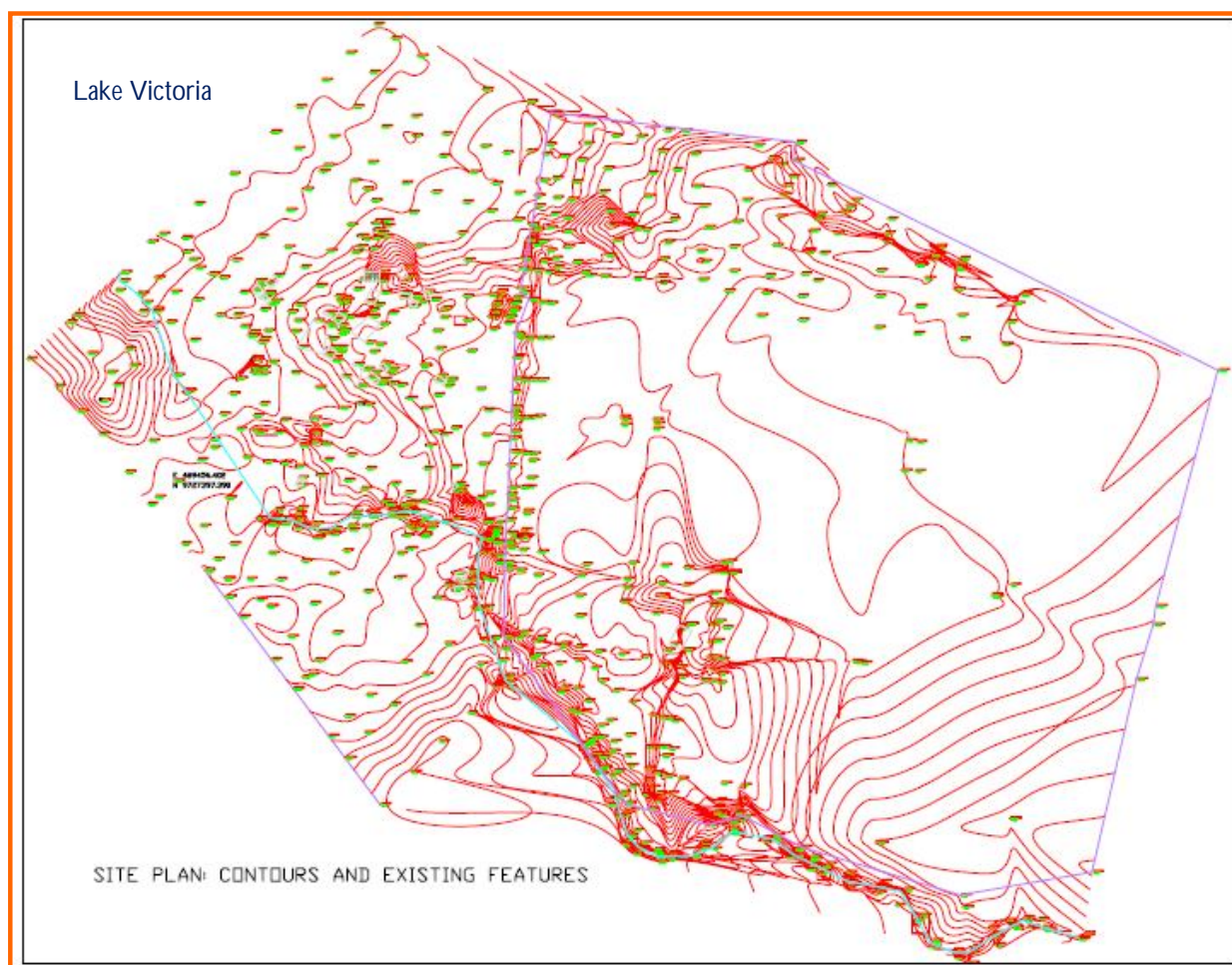


Figure 6: Contoured layout plan and existing features of the proposed project area

## 2.6 Project Requirements

Constructed wetlands consist of properly designed basins that contain water, a substrate and vascular plants. The construction materials such as cement, pipes and aggregate will be obtained from local dealers in Mwanza. About 6 hectares of land will be needed for constructing the wetland.

The construction of wetland is generally a labour intensive component. Apart from technical and skilled manpower, recruitment for unskilled labour will be done locally. About 70 people will be employed by the project.

### 2.6.1 Water for construction works and for operation

Water will be required for construction works and also during operation of the constructed wetlands. Water for running the wetland will equally be required. Water for works will be obtained from Lake Victoria while water for operation will be that draining from the waste stabilization ponds.

### 2.6.2 Substrates, Sediments

Substrates used to construct wetlands include soil, sand, gravel, rock and organic materials. These will be natural materials found around the project site.

### **2.6.3 Vegetation**

Both vascular plants (the higher plants) and non-vascular plants (algae) are the important components of the constructed wetlands. These plants may include floating and rooted mosses, rooted ferns, conifers, floating, submerged and emergent herbs. All these require consideration for achieving a better wastewater treatment result. Therefore the detailed engineering design will consider all these type of plants that have been researched in our institutions of learning and other overseas places where such researches have been carried out.

Also the proposed project will require various locally available construction materials for wetland construction. Such locally available materials required include aggregates, sand and water.

### **2.6.4 Aggregates for Works**

Aggregates or crushed stones will be required for lining of the embankment, berms or dikes. These are likely to be obtained away from the project area. Such volumes can be obtained and transported by trucks. Since the crusher plant is owned by others and the contractor goes to this site to procure materials then no off site investments will be required.

### **2.6.5 Gravel**

Gravel will equally be obtained from off-site borrow areas. 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 site, then there might be some off-site investment in terms of storage for fuel to run the equipment.

### **3. Policy, Administrative and Legal Frameworks**

#### **3.1 General Introduction**

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

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

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

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

#### **3.2 Environmental National Policies**

##### **The National Environmental Policy, NEP (1997)**

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

##### **The National Land Policy (1996)**

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

City Council is in the process of effecting compensation to all people using the land particularly those likely to be affected by the proposed project.

### **National Water Policy (2002)**

The National Water Policy (NAWAPO 2002) requires presence of wastewater treatment system which is environmentally friendly. The construction of the wetland is part of implementation of this policy and the proponent, the Ministry of Water is the source of the policy therefore all efforts will be made to observe the requirements of this policy.

**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". For this case, no historical or cultural sites observed in the area, however, MWAUWASA and the contractor will follow the requirements of this policy and in case such historical or cultural sites are discovered, appropriate measures will be taken to involve local and national authorities in their conservation.

### **The National Policy on HIV/AIDS (2001)**

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

- Prevention of transmission of HIV/AIDS
- HIV/AIDS Testing through voluntary testing with pre-and-post test counselling
- Care for people living with HIV/AIDS (PLHAs)
- To strengthen the role of all the sectors, public, private, NGOs, faith groups, PLHAs, CBOs and other specific groups to ensure that all stake holders are actively involved in HIV/AIDS work and to provide a framework for coordination and collaboration
- Research on HIV/AIDS
- To create legal framework by enacting a law on HIV/AIDS with a view to establishing multi-sectoral response to HIV/AIDS and to address legal and ethical issues in HIV/AIDS and to revise the legal situation of families affected by HIV/AIDS in order to give them access to family property after the death of their parent(s).
- Other objectives include
  - To monitor the efforts towards community mobilization for living positively with HIV/AIDS in order to cope with the impact of the epidemic while safeguarding the rights of those infected or affected directly by HIV/AIDS in the community.
  - To identify human rights abuses in HIV/AIDS and to protect PLHAs and everyone else in society against all forms of discrimination and social injustice.
  - To provide appropriate effective treatment for opportunistic infections at all levels of the health care system
  - To work closely with the Ministry of Home Affairs, NGOs and Faith Groups in the fight against drug substance abuse that increases the risk of HIV transmission
  - To prohibit misleading advertisements of drugs and other products for HIV/AIDS prevention, treatment and care.

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

### **The National Employment Policy (1997)**

The policy aims at

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

In view of the Government efforts in development of National Employment Policy, the project proponent, contractors in collaboration with Mwanza City Council intend to supplement these efforts by providing some few employments during the project implementation. During this period, transfer of technology will 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.

### **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, the policy 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.

### **MKUKUTA (2003)**

This is national strategy for growth and reduction of poverty, MKUKUTA is committed to ensuring that any development activity today does not adversely affect the development needs for future generations. The strategy stresses on the sustainable use of the country's natural resources and avoiding harmful effects on the environment and on people's livelihood.

Moreover, the strategy identifies several sources of growth meant for poverty reduction, one of them being Investment in Physical Capital which mainly emphasis on efficient and cost effective provision of infrastructure for transport, power, ICT, with special attention to opening up rural areas and areas with economic potentials in order to address region inequalities.

### **National Construction Industry Policy (2003)**

The main objectives of the Construction Industry Policy include:

- To improve the capacity and competitiveness of the local construction enterprises (contractors, consultants and informal sector)
- To develop an efficient and self-sustaining roads network that is capable of meeting the diverse needs for construction upgrading and maintenance of civil works for trunk, regional, districts and feeder roads network.
- To improve the capacity and performance of the public sector and private sector clients so as to ensure efficient, transparent and effective implementation and management of construction projects.
- To ensure efficient and cost effective performance of the construction industry that will guarantee value for money on constructed facilities in line with best practices.
- To promote application of cost effective and innovative technologies and practices to support socio-economic development activities such as road works, water supply, sanitation, shelter delivery and income generating activities.
- To ensure application of practices, technologies and products which are not harmful to both environment and human health
- To mobilize adequate resources from both the public sector and the private sector for construction and maintenance of public infrastructure.
- To enhance participation in regional and international co-operation arrangements for the purpose of promoting the capacity and competitiveness of the industry and developing markets for export of its services and products.
- To improve co-ordination, collaboration and performance of the institutions supporting the development and performance of the construction industry.

With respect to environmental protection and conservation, section 8.2.2 of the National Construction Industry Policy addresses a number of issues regarding the environment. The construction industry is generally said to be a major source of environmental damage and occupational health problems. A number of the industry's activities are environmentally not sustainable partly owing to lack of awareness of environmentally sound practices and technologies.

Moreover, construction activities affect the environment in many ways: through resource deterioration, physical disruption and chemical pollution. Large civil engineering projects can easily destabilize fragile hill slopes. Cement, lime and bitumen production pollutes the atmosphere. This policy will be made the corner stone of the proposed artificial wetland project to ensure that the benefits of the project are realised.

### **The Mineral Policy of Tanzania (1997)**

The mineral policy was specifically set for the mineral sector aimed to attract and enable the private sector to take the lead in exploration, mining development, mineral beneficiation and marketing. The policy identifies the role of public sector as to stimulate and guide private mining investment by administering, regulating and promoting the growth of the sector. The policy has put forward some objectives for the mineral sector as follows:

- To estimate exploration and mining development;
- To regulate and improve artisanal mining;
- To ensure that mining wealth supports sustainable economic and social development;
- To minimize or eliminate the adverse social and environmental impacts of mining development;



- To promote and facilitate mineral and mineral-based products marketing arrangement;
- To alleviate poverty especially for artisanal and small scale miners

With specific regard to the infrastructure development sector, section 3.3.8 of the policy stresses on the creation and maintaining of reliable social and economic infrastructure facilities, such as transport; water supply; power supply; communications; education and health services; and recreation are vital for the mineral sector's development.

Moreover, section 3.3.12 of the Tanzania mineral policy emphasises on the integration of environmental and social concerns into mineral development programmes as a means for sustainability of mining sector. As mineral extraction involves different complex processes which directly affect the environment, the policy was set to address all issues due mineral development with respect to the environment. Some of issues addressed are to: reduce or eliminate the adverse environmental effect of mining; improve health and safety conditions in mining areas; and address social issues affecting women, children and the local community. The project proponent as well as the contractors in the artificial wetland project will abide to the Mineral Policy in mining areas for gravel, sand and aggregates.

### **3.3 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 Wetland Project triggers some of these operational policies of the World Bank as presented below.

#### **3.3.1 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 the Preliminary Environmental Assessment study to assess the social and environmental impacts of the artificial wetland project.

### **3.3.2 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 possess, 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 loss of land resulting in from 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 are consistent with the World Bank Operational Guidelines. Therefore, since this project is partly financed by the World Bank the requirements of this policy. It is evident from the recognition of these requirements that Mwanza City Council had initiated compensation process for people having activities in the area under the existing land laws of Tanzania.

### **3.3.3 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. Preliminary Environmental Assessment Study has identified these natural habitats at Butuja and mitigation measures are provided.

### **3.3.4 OP/BP 4.11 Physical Cultural Resources**

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

This policy applies to all projects requiring a Category A or B Environmental Assessment under OP 4.01, project located in, or in the vicinity of, recognized cultural heritage sites, and projects designed to support the management or conservation of physical cultural resources.

The policy may be triggered during excavation of fill materials at both existing and new borrow sites therefore measures will be put in place to observe the requirements of this policy during execution of the project.

### **3.3.5 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-generational inclusive social and economic benefits.

The policy is triggered as it is expected that some indigenous peoples who are still occupying the land will be affected by the proposed project, and measures to resolve the social impacts were initiated by the Mwanza City Council through initiation of valuation and compensation processes.

## **3.4 Laws, Regulations and Guidelines**

### **3.4.1 Acts Dealing with Environment or relate to EIA**

#### **The Environmental Management Act (EMA), Cap 191 (No. 20 of 2004)**

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

environmental decision-making. NEMC is responsible for screening and reviewing various investments and projects of the national significance.

### **Environmental Impact Assessment and Audit Regulation of 2005**

These regulations were prepared under EMA Cap. 191 and require developers to conduct an Environmental Impact Assessment for any project likely to have negative impacts on the environment. Application for an Environmental Impact Assessment certificate is necessary for such project. The EIA process for the project was initiated and the screening decision resulted into preparation of this Preliminary Environmental Assessment.

## **3.4.2 Acts Dealing with Land and 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 project, Mwanza City Council has already initiated a process of valuation, compensation to effect resettlement of the existing land users to pave the way for construction of the artificial wetlands.

### **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). The project proponent is aware of the land acquisition procedures and will follow them for smooth implementation of the project.

### **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 inadequate.

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. Fortunately Mwanza City Council who has authority over the land in the city premises has already initiated the process of land acquisition based on the requirements of this Act.

### **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 restrictions on this project development as the proposed site is located in the area which was previously planned to be used by the city council for such developments.

### **3.4.3 Acts Dealing with Natural Resources**

#### **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 building materials will be mined from existing borrow areas or new ones developed in agreement with the authorities where by all the requirements of the Act will be observed around the project area and all sources of construction materials.

#### **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. MWAUWASA will be vigilant while observing the requirements of the Act during the project life in order to safeguard waters of Lake Victoria and surrounding environment.

#### **The Water Resource Management (Water Abstraction, Use and Discharge) Regulations, 2010**

The Water Resource Management (Water Abstraction, Use and Discharge) Regulations, 2010 were made under Cap. 331 and requires that there must be application for Discharge Permit

and the application is made to the Basin Water Officer. For this project, MWAUWASA is currently discharging wastewater from its treatment plant into Lake Victoria, thus observation of these regulations will be important.

### **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. MWAUWASA and other project stakeholders responsible for this project will ensure that the requirements of this Act are met.

#### **3.4.4 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.

Wetlands construction project is an engineering assignment and the project proponent will observe all 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 construction, installation, erection or demobilizing works for the purpose of verifying and ensuring that the works are being undertaken by registered contractors; and that the works comply with all governing regulations and laws of the country.

##### **The Occupational Health and Safety Act No. 5 of 2003**

This Act sets provisions for the safety, health and welfare of persons at work in factories and other places of work. It is also meant to provide for the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with activities of persons at work; and to provide for connected matters. The Wetland 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.

### **3.4.5 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/ sub-ward authorities. At the sub-ward level, the government structure is comprised of a sub-ward assembly consisting of all persons aged 18 and above. There are also sub-ward committees covering such matters as planning, finance, economic affairs, social services, security, forest protection, water resources etc [Section 35].

The sub-ward council's functions and roles include planning and coordinating activities, rendering assistance and advice to the sub-ward members engaged in agriculture, forestry, horticultural, industrial or any other activity, and to encourage subward residents to undertake and participate in communal enterprises. As an administrative subdivision between the sub-ward and the district, the ward reviews the proposed sub-ward 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, sub-wards will work hand in hand with Mwanza City Council and other local government structures for the success of the project.

### **3.4.6 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 wetland project, work will be carried out in environments likely to be affected if mitigation measures are not strictly applied.

Table 1: Multilateral Environmental Agreements (MEAs), Treaties and Conventions to which Tanzania is a party

Type of Convention	Name of Convention	Relevance to the Project
1. Bio diversity related Conventions	1. Convention of Biological Diversity (1992) ratified by Tanzania in 1996).	Project activities involve clearing of vegetation. The Ilemela 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)	
2.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 field study as the area is regularly cleared to support agricultural activities. The project staff, residents 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).	
3.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)	
4.Regional conventions	1. The Convention on the conservation of Nature and Natural Resources, 1968 Algiers, (1968)	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)
	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	
	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)	



### 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 Wetlands 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 sub ward 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, sub-village 'mtaa' or 'kitongoji' and Environmental Management Officer coordinates all functions and activities related to protection of environmental in their areas. In all levels starting at the regional level towards sub-ward level- (i.e. Mwanza Region, Ilemela District, Ilemela ward and Butuja sub-ward, such environmental structures are developed and the Consultants consulted them to ensure that they are aware of the project and they will work hand in hand with the project proponent in fulfilling the environmental requirements.

## **4. Baseline Conditions**

### **4.1 Physical Environment**

#### **4.1.1 Soil**

Mwanza city particularly the area closer to the project site is characterised by gently undulating granites and granodiorite physiography with isolated hill masses and rock inselbergs. The soils are usually associated with inselbergs of between 1100-1600 metres in height. Mwanza in general the soil is alluvial in nature which is normally fertile. It is also characterised by well-drained sandy loamy soil generated from coarse grained cretaceous.

#### **4.1.2 Climate**

##### **Rainfall Patterns**

The City receives heavy rainfall almost throughout the year. It experiences between 700mm and 1000mm of rainfall per annum, falling in two fairly distinct seasons i.e. between the months of October and December, and between February and May.

##### **Temperature**

The temperature variations are minimal but influenced by altitude and proximity to the Lake Victoria amongst other factors. The mean temperature of Mwanza city ranges between 25.7°C and 30.2°C in hot season and 15.4°C and 18.6°C in the cooler months.

#### **4.1.3 Prominence**

Mwanza City is the major industrial and commercial centre of the Mwanza Region as well as the key industrial and commercial centre in the north-western part of Tanzania. In addition to many light and service industries, Mwanza accommodates large water intensive industries including textile mills, leather tanning factories, bottling industries, vegetable oil factories, fish processing plants, soft drink manufacturers and cosmetic/soap factories.

There are numerous institutions in Mwanza City including hospitals, dispensaries and health centres and many primary and secondary schools and private universities.

### **4.2 Biological Environment**

A site-specific ecological study was undertaken during June 2012 by the consultants to assess the impact of the proposed development on existing biological environment. A baseline study was carried out to establish the status of fauna and flora in the proposed area for construction of the wetland, the area covering about 13 hectares.

The proposed area lies in a relatively flat area currently used for by the residents to grow food crops such as maize and rice and partly used for human settlement. The natural vegetation which would have provided cover to fauna has therefore been replaced with crops and buildings except few scattered trees and shrubs. A survey of the fauna in the area also involved interviews with the local communities coupled with direct physical observations while evidence was recorded by different methods including taking pictures.

The artificial wetland development project falls within an area that is not protected from human activities and therefore no special ecological feature was noted due to the diversity of activities carried out in the area including vegetation clearance and use of fire in burning the brush.

It was concluded that should the development take place, if there are isolated areas where there are colonies of flora and fauna requiring any ecological preservation, care must be taken to minimize any likely ecological impact.

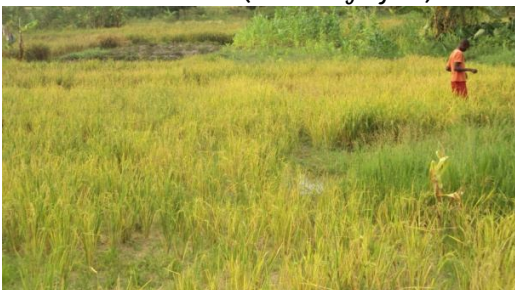
The following are the pictures taken at the proposed area for construction of the wetlands.



Guava trees (*Psidium guajava*)



Okra plants (*Abelmoschus esculentus*)



Rice (*Oryza sativa*) field



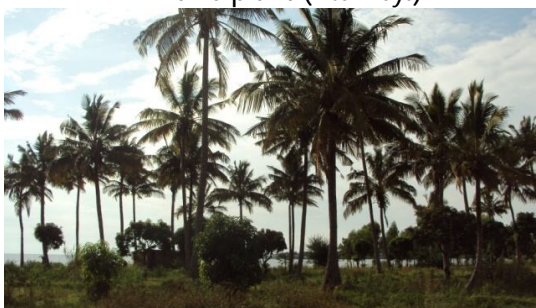
Sorghum (*Sorghum bicolor*) farm



Maize plant (*Zea mays*)



Mango tree (*Mangifera indica*)



Coconut trees (*Cocos nucifera*)



Scattered grasses and trees near the homestead

Figure 7: Plant species and crops existing at the proposed project area

## 4.3 Socio-Cultural Environment

### 4.3.1 Population

Mwanza urban area (Mwanza city) lies on two districts (Nyamagana and Ilemela). According to the countrywide 2002 natocensus, the total area of the two districts including rural and semi-rural areas accounts for a total of 476,000 habitants. The current total population of Mwanza, according to the projection based on the 2002 census is estimated to be 720,000 people, with an annual growth rate of 3.2% (national census Report 2002), internal migrations of people from rural to urban areas of 8%. The population density is 134 people per sq. km, being the second region in the country after Dar es Salaam.

The study area is located in Ilemela ward having the population of 28,444 people, with 11,388 males, 12,476 females and 4,580 children.

### 4.3.2 Land use

The proposed area for construction of the wetland is used for small scale agricultural activities, light human settlements and fishing.

For more information on this issue is that the proposed area part of the area that Mwanza City Council planned to acquire and own it some years ago, but, there are local people who occupy the area and they use it for settlement, cultivation and fishing. Mwanza City council made a resettlement action plan in the year 2002 so that those people can vacate the area and let the area free for other development plans of the City.

In this resettlement action plan, a total of 198 persons were to be resettled. The City council made property valuation for properties of these land users. A total of 215,000,000 Tshs was a figure required for compensation for buildings only, but payment was not done at that time.

In the year 2007, a total of 170 persons out of 198 were compensated a sum of 110,531,513 Tshs. The rest 18 persons are in process to be paid.

Later on, people claimed that there other allowances which were not included in the first phase of valuation. The claims based on The Land Act of 1999 which became active in 2001, that it requires *"To pay full, fair 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."*

The Land (Assessment of the Value of Land for Compensation) Regulations, 2001 made under Section 179 of the Land Act No. 4 of 1999 which became operational in May 2001 provide assessment of compensation on land to be based on the following:

- a) Market value of un-exhausted improvements
- b) Disturbance allowance
- c) Transport allowance
- d) Loss of profit
- e) Accommodation allowance

Following that observation, a total of 91 persons out of 198 were the claimants. The computation of these forgotten allowances summed 54,510,911 Tshs, out of which 28,303,751 Tshs, up to now is already paid and the remaining 26,207,160 Tshs is in the process to be paid.

However, the city council has a plan to pay 5,000,000 Tshs every month as compensation.

### **Agriculture**

Generally, agricultural activities in Mwanza are undertaken in both urban and rural areas where both food and cash crops are cultivated. Food crops cultivated in both Ilemela and Nyamagana includes cassava, paddy, sweet potatoes, maize, sorghum, pulses, vegetables and fruits and cash crop cultivated is cotton.



Figure 8: Mixed farming carried out in Butuja area (Proposed wetland)

### **Livestock**

Livestock available in Mwanza City includes; Goats, sheep, cows, pigs, hens' indigenous bread, Broilers, jayerns and donkeys. Most of the urban-based wards are practicing poultry farming and zero grazing livestock keeping. The City is enjoying livestock products such as milk, eggs, cattle meat and skins. Litres of milk produced at Nyamagana District were 18,428,280 litres by the year 2009 from indigenous cattle, dairy cattle and dairy goats which was valued at Tsh 13,985,760,000/=.

### **Fishing**

Fishing in Lake Victoria has a long historical background. However, the introduction of Nile perch or *lattes niloticus* to the Lake has changed both the social and economic nature of the sector. Today fishing is done mainly for commercial purposes, contrary to the traditional fishing which focused to household consumptions.

The emergence of the Nile Perch trade has created new opportunities for development in the region. According to available statistics from the fish processing plants in Mwanza and Musoma towns, the fish industry has created direct employment for over 8,000 locals and outsiders and indirectly employed about 300,000 others.

At the same time, an estimated three million people living around Lake Victoria in Mwanza, Mara and Kagera regions have been also benefiting from the Nile perch trade ( popularly known as marine gold) in one way or another, causing the rapid growth of social and economic activities in the region. There are also about 52,000 fishermen on the Tanzanian side of Lake Victoria who benefit directly from Nile perch. Sources indicate that in 1999/2000, local fishermen earned Tshs 182 million ( \$ 182,000) daily from selling their catch to the fish processing plants.

It is also estimated that local fishermen earn about Tsh 65.5 billion ( \$ 65.5 million) annually from the sale of Nile perch to 12 fish processing plants that have sprung up around the lake. There are chances that, these earnings may rise by 40 per cent depending on market prices and the availability of the fish (Nile perch) from the lake. Trade in the fish contributes about Tshs 1.7 billion ( \$ 1.7 Million) annually in levies to the Mwanza City Council alone.

According to the 2001 economic development report issued by the Regional commissioner, Mwanza City Council received about Tshs 1.3 billion (\$1.3 million) in fish levy from the sale of fresh Nile perch processed by the fish plants between April and December 2001. Earnings for the central government in taxes and royalty from exportation of Nile perch fillets were estimated at Tshs 10 billion (\$ 10 million) annually.

#### **4.3.3 Other Income Generating Activities (IGA)**

The analysis of social economic activities was carried out to determine income and expenditure pattern of people living in the project area ward. 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.

In access to, and utilization of production resources, both genders are involved. Both men and women are in industrial works, fishing, agriculture, retail business, operating food-vending, casual labour and forestry products. Ownership of means of production such as land, basic capital assets (house, furniture's etc) is almost balanced between men and women. In some cases ownership of agricultural harvest is based on the male domination where, husband and wife (wives) have separate plots. However, at the end men are regarded as the owner and final decision maker over the family resources.

According to anecdotal information industry sector contributed about 40 % of the GDP, followed by business operations 30 %, formal employment 7 %, fishing 17% and 6 % from other activities. The per capital income of Mwanza residents stands at an average of US \$21 per month of which majority of residents depend on the following sectors:

#### **Industries**

There are about 60 different type of industries in Mwanza: fish processing (6); cotton seed oil industries (6); breweries (1), soft drink factory (1) bakeries & biscuits (100); medium & small milling machines; timber industries; garages; fabricating workshops; ginneries; foam & plastic industries; soap factories; quarry sites & animal food industries. This number is expected to increase due to the Government's efforts to build good roads and the rapid growth of the information technology sector.

#### **Timber Industries**

There are industries which produce timbers of different sizes. The timber processed includes pines (mostly *Pinus caribaea*), *Pterocarpus angolensis* (mninga) and *Brachystegia speciformis* (mtundu) from outside city. The city has about 29 reserved Forests from which 10 are from Ilemela district and 19 from Nyamagana district with the total area of 2,955 Ha.

### **4.4 Provision of Social Services**

#### **4.4.1 Water supply**

The demand for water in Mwanza City and in study area in particular has been increasing rapidly due to high rate of population growth. Lake Victoria is the main source of water for the city. Other sources include rivers, and springs and ground water especially in peri-urban areas such as in Buhongwa ward. The water sources, storage and distribution facilities have adequate capacity to meet existing demand of 65,000 m<sup>3</sup> per day but pumping capacity is only 42,000 m<sup>3</sup> per day. Water quality is also becoming a matter for serious concern due to the declining quality of the Lake Victoria environment.

#### 4.4.2 Energy

Mwanza City is supplied with electricity from the national grid but only about 33,000 customers are connected. Rapid population increase and the high demand for charcoal and firewood has led to massive deforestation and to increased surface run off, siltation of streams, rivers and the lake, exposing the city to landslides, soil erosion and flooding. In the study area is denied this service because the area is prohibited from human activities including settlement.

#### 4.4.3 Health facilities

Mwanza city has 105 health facilities including 6 hospitals, 10 health centres, 87 dispensaries and 2 clinics. Two of the hospitals, three health centres and 24 dispensaries are government facilities while the rest are private. Most facilities are located in the centre of the city and only few are dispersed in the periphery. Malaria is the leading disease affecting the majority of the population of all age groups. Communities are involved in managing health facilities through health facility and ward health committees and the City Health Board. They prioritize health problems and participate in planning rehabilitation and renovation of public health facilities. A cost sharing programme contributes resources for improving the quality of in the public health services in the city. Butuja area poses a unique scenario since the area is preserved for liquid waste disposal but people are still living in the area. There is a series of cholera outbreaks of which in 2010 cholera claimed lives of 7 people. Malaria is also rampant in the area as shown in the table below.



Figure 9: The toilet found in the proposed project area

Table 2: Some common diseases in Ilemela ward in 2011

Diseases	Under 5 years	5 years +
Malaria	2836	1063
Diarrhoeal diseases	849	235
Intestinal worms	590	457
Skin infections	994	225
UTI	417	621
Schistosomiasis	0	35

#### 4.4.4 HIV/AIDS

The diversity of its social and economic activities, its location and transport links attract many people to Mwanza making it a high HIV/AIDS prevalence city. According to the



comprehensive council health plan for Mwanza City 2010 / 2011 the current prevalence is 5.6% of the population. HIV/AIDS Committees have been initiated and more than 14,201 have obtained counselling and testing services at 17 Voluntary Counselling and Testing Centres in the city in 2011. Some patients are accessing ARV drugs. The number of orphans is increasing rapidly in the city.

#### **4.4.5 Education**

There are 164 primary schools in the City including 142 government and 22 private schools up from 63 in 1998 due to implantation of the Primary Education Development Programme. The schools face shortages of 948 teachers, 1,634 Classrooms, 26,327 Desks, 2,517 Toilets and 2,654 teachers' houses. Classrooms are overcrowded and the few toilets available regularly overflow due to over-use, posing a danger to health. Mwanza City has 38 secondary schools, of which 22 are government and 16 are private schools. Public secondary schools face shortage of teachers, laboratories, libraries, classrooms, desks and tables, teachers' houses, books and toilets. There are 36 Vocational Training Centres (VTCs) that provide a wide variety of skills training.

#### **4.4.6 Roads**

Mwanza City has 863km of roads of which 75 percent are unpaved. Plans are underway to use stones for road paving to reduce costs. The City Council has acquired a stone cutting machine for the purpose. In the study area, there are only footpaths from the residents towards the lake, but there is a nearby road, Makongoro road.

#### **4.4.7 Solid Waste Management**

Mwanza city generates about 385 tons a day of domestic solid waste and about 500 tons of industrial refuse per day, through most industries do not keep records of the quantity of waste generated. Some of the fish processing industries dispose the wastes on a dig and fill basis but often the waste is left abandoned in open areas becoming a potential health hazard. The capacity of the council is limited to 5 refuse trucks, 4 side loaders, 2 wheel loaders, 1 skip loader and 25 skip buckets. About 45 percent of the solid waste is collected by CBOs and a private company. Residents and business pay refuse collection charges but many communities are unwilling to do so. Domestic refuse is collected from 13 of the 21 collecting centres. Solid waste in most of the unplanned settlements which are inaccessible is disposed on site by burning or burying. Management of hazardous hospital waste is poor and only one of the three public hospitals has a properly functioning incinerator. Solid waste is disposed at the Buhongwa dumpsite, 18 km from the city centre. The facility was designed as a sanitary land fill site, but dumping of waste is crude and disorderly and none of the equipment is in working order. There is no weighting bridge and the site is not fenced to prevent unauthorized access.

#### **4.4.8 Liquid Waste Management**

Due to poverty, inaccessibility and difficult terrain, most city residents especially in the unplanned settlements, use pit latrines. The shallow pit latrines overflow during heavy rains, releasing faecal wasters into waterways draining into the lake and contaminating the main city water intake at Capri Point. Most households who use septic tanks discharge waste water from kitchens and bathrooms into storm water drains. Both septic tanks and a reticulated

sewerage system are used in the city centre. There is a reticulated sewerage system with a capacity of 5,000 m<sup>3</sup> per day but only 2,300 m<sup>2</sup> per day is utilized.



Figure 10: Waste Stabilization Ponds at Butuja- Ilemela

On average, 10 to 12 trips of liquid waste are delivered for disposal at the Buhongwa site per day, where only two of the 18 cells are operational. Most fish processing factories discharge vast amounts of harmful wastewater into the lake.

#### **4.5 Rationale of constructing Artificial Wetland Treatment Facility**

Lake Victoria forms the final receiving water body in Mwanza city environment. The lake borders the city on the western side and is characterised with bays and swamps. The lake is the source of the urban water supply system. More or less all water supplies derived from the Lake Victoria are more or less all returned as wastewater. World Bank has funded project and studies on the lake water quality including putting in place several initiatives for the protection of the lake. Specific problem is the control of water hyacinth infestation in the lake. The proliferation of water hyacinths is attributed to relatively high nutrient (nitrogen and phosphorus) loading in the lake from both diffuse and point pollution sources, for example sewage and runoffs from agricultural land. According to the LVEMP surveillance data the Mwanza bays have relatively high levels of organic pollution as judged from the Bio-chemical Oxygen Demand (BOD) and dissolved oxygen (DO) concentrations. Such BOD levels exceeding 10 mg/l for huge water body like Lake Victoria is considered to be high, which calls for immediate intervention. The faecal coliforms data confirms that the lake is grossly contaminated with sewage. Again, such contamination threatens the suitability of the lake as a source of domestic water supplies in accordance with Tanzania Temporary Standards for Drinking and Receiving Water Bodies. As per standards, the limit value of BOD is 5 mg/l for water used as a source of water supplies.

The danger in such a sensitive biological sphere as the Lake Victoria is the fact that the biological situation can turn or skip from the living and self-cleaning condition, which still prevails, to a biologically 'dead' situation, where the now prevailing conditions are reversed and the considered part of the Lake turns from a self-cleansing system into a dead dump! If that occurs the dissolved oxygen is marginalized below the surface and anaerobic conditions turn the respective part of the Lake into a facultative behaviour.

Since the population of Mwanza Urban completely relies on the function of the Lake for livelihood (water supply, sanitation, fish industry, micro-climate), such a skip of the biological conditions of the relevant part of the Lake must be prevented by all means. Provision of adequate sanitation systems is thus a priority for the purpose of controlling incessant discharge of wastewater from point pollution sources into the lake.

#### 4.6 Housing and Informal 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. Through 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 house in the study area.

The situation of housing in the study area' exhibit typical two categories. One is housing in planned and surveyed areas and second is in unplanned (squatter) areas where our study focuses. The current statistics show that the City has about 50,000 housing units out of which 60% are built in the unplanned areas. In this case the project area at Butuja is not only among the unplanned area but also prohibited area for human settlement.



Figure 11: Unplanned Settlements in Butuja (Prohibited area)

Unplanned settlements accommodate about 70% of the city population. Unplanned settlements are characterised by: High congestion of buildings Poor accessibility, lack of physical infrastructures like, roads, and electricity as well as public facilities like dispensaries, open spaces etc. Inadequate hygienic services like toilets, disposal of liquid and solid wastes.

## 5. Stakeholders Consultations and Public Involvements

### 5.1 Stakeholder Consultations

Stakeholders' consultation in the initial stages of the project is of great importance particularly during preliminary or feasibility studies as well as the planning, preliminary environmental assessment, design and implementation of the proposed development. The consultant conducted the public participation activities which involved the necessary potential Interested and Affected Parties (I&APs). The comments received and issues raised during these public participation exercises have been incorporated into this PEA report and used in determining mitigation measures for the project. Public participation made through public meetings 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.

### 5.2 Public Involvements Process

Issues pertaining to construction of the artificial wetland and its environmental and social consequences were discussed with the residents and interested members of the communities around the project area in Mwanza City, particularly those residing and/or having regular business at Butuja.

Some of the meetings were held at the City Council where technical and administrative staff participated fully in consultation process. Among many others, the following officials were consulted; the City Director, City Planning Officer (CPLD), City Engineer, Water Technician, City Community Development Officer (CCDO), Director MWAUWASA, Mwanza Sewerage and Sanitation Officers. The discussions focused on existing water supply, sanitation and land use pattern in the project site, socio-economic situation, anticipated impacts (both positive and negative) and corresponding possible enhancement measures and mitigation measures and lack of enough funds to relocate people from the project area. The information obtained from these consultation meetings helped the consultants to devise mitigation measures.

The key stakeholders who were involved are listed below:

- Regional Administrative Secretary
- Mwanza City Director
- Mwanza City Engineer
- Mwanza City Environmental Officer
- Mwanza City Economist
- Mwanza City Agricultural Officer
- Mwanza City Community Development Officer
- Ilemela District Administrative Officer
- Ilemela Division Officer

### 5.2.1 Views from MWAUWASA and Mwanza City Council

The respondents from MWAUWASA and Mwanza City Council had the following views regarding construction of Artificial Wetland at Butuja

1. Water hyacinth is the problem in Lake Victoria – due to increased nutrient loading from uncollected/unmanaged sewage that reach the lake (accelerate eutrophication process). This situation discourages the present effort so far taken to clean and protect Lake Victoria.
2. Contamination of water supply source (Lake Victoria) causes increase in treatment costs and therefore need for higher customer tariffs.
3. Depending on the prevailing conditions, the decreased water quality of Lake Victoria could affect the external fish market. Any effect to especially commercial fishing will result into a severe economic impact that will trickle down to family hardships and associated social consequences of varying degrees.
4. Increased industrial liquid waste flows (with varying complexity and different composition) due to expansion of industrial development as a response to availability of good supply of water. If there is no sufficient capacity to handle the effluents, water in Lake Victoria will cause more health risks to both human beings and several of marine species.
5. Generally without upgrading and extension of the existing sewerage system, any economic and commercial growth will multiply the already negative impacts of the existing and inadequate sanitation system and thus jeopardize economic growth, public health and quality of life. So it is imperative to construct an artificial wetland to reduce the impact.

Also the surrounding communities were sensitized to participate in public consultation meetings. The intention to conduct consultation meeting was communicated to the respective community on 21<sup>st</sup> June 2012. During this site familiarization, notification letters were served to Butuja sub-ward chairperson to inform the community to participate in consultation meeting. On 24<sup>th</sup> June 2012, the meeting was held at Butuja sub ward to discuss on the proposed construction of the wetland. The attendance to the consultation meeting was recorded on the picture below and the list of attendance and minutes of consultation meeting is presented under appendices 3 and 4.



Figure 12: The pictures for public meeting at Butuja sub ward

### 5.3 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.

#### 5.3.1 Issues from the public meeting at Butuja sub-ward

In the meeting, people participated by asking questions, giving comments, views and any contribution. The following are some of the issues raised:

1. **Mr. Mkoba**

- Which side is exactly needed, Butuja A or Butuja B?

**Response:** Butuja B.

- Among the impacts which will face us is Cholera.

2. **Mr. Msiba**

- What about 70m of the Lake Victoria buffer zone, will it be within the wetland?

3. **Mr. Katemi Grubai**

- If they will take the land for the wetland project, where will the land owners go?

**Response:** Affected persons will be compensated as it happened before to those who were living in the area now occupied by the waste stabilization ponds.

4. **Mr. Magesa**

- The existing ponds affect us very much. The resulting smell is like a person is locked in the toilet. If they want the area for the wetland, then, they have to compensate all people at Butuja so that we can leave and find another place for settlement.

5. **Mr. Makoye**

- How will the affected people benefit from the wetland project?

**Response:** The affected persons may be given first propriety in employment Properties for the affected persons will be compensated and they will have to relocate. The proponent will find the better way not to affect much the existing activities such as fishing. Of course there will be reduction of water related diseases and water borne diseases, and this is a direct as water will be safer.

6. **Mr. Akson Majura**

- We want all of us to be relocated.

7. **Mr. Samson Sungura**

- We all need to be relocated, not part of our land.

8. **Mr. Dickson Maira**

- MWAUWASA have been using the same style as you are now telling us to take our land; it seems you want to do the same!

**Response:**

Those who will be within the proposed area for the wetland are the only ones to be relocated, not the whole sub ward. However, this issue will be communicated to the project proponent for actions.

Generally, the community at Butuja were not happy with the style the project has been progressing and are thus reluctant to accept the project. To the surprise of the consultants, some members of the local community forced the meeting to be closed prematurely (before estimated time) as they were angry with the delays in compensation for their properties which was conducted by the Mwanza City Council since year 2002.

### **5.3.2 Perceived negative Impacts of the Project**

People worries over the project include the following:

- Loss of farming plots (proposed wetland area).
- Unnecessary delay of compensation and that few people have been compensated while majority has not received anything.
- Expected odour/obnoxious smell from the works –inadequately treated wastewater produces odour that become a nuisance to the people.
- Destruction and removal of residential houses without compensation (During resettlement assessment/ valuation there were 198 households in 2002, but now there are more than 600 households).
- Increased water borne and other water related diseases like typhoid, diarrhoea, malaria etc. will increase due to possible wastewater overflows as the result of surcharges. Worm diseases may also increase due to poor sanitation conditions.

## 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 land acquisition, 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

The possible positive impacts which will result from the implementation of the proposed artificial wetland project and need to be enhanced include:

- Improvement in health condition and sanitation through discharge of water which meets wastewater discharge standards to the Lake and thus reduction of pollution of Lake Victoria;
- Reduction of contamination of existing water resources and sources e.g. water wells serving as sources of domestic water supply;
- Temporary employment e.g. labour force; as part of enhancement measures the following be considered:
  - The project coordinator will consult TACAIDS and specialised NGOs such as AMREF, FHI, PLAN International and GTZ with IEC skills in defining an awareness programme for construction workers, to include selective recruitment of local resident workers reinforced by contract Conditions.
  - Provision of health checks and health service aimed at reduction of STDs among workers
  - Establishment of an awareness campaign to be operated by existing NGOs and or skilled practitioners
- Reduction of water related diseases resulting from Lake water pollution
- Creation of new businesses at the construction site e.g. the community around the project site will exploit new business opportunities such as food vendors (*Mama Ntilie/Lishe*)

### 6.2 Negative Impacts

#### 6.2.1 Mobilization Phase

##### i. Relocation of properties (land loss)

Properties within the project area will need to give way to allow construction of the wetlands.



Figure 13: Properties located on the west side of the existing ponds to be affected by the project





Figure 14: Some properties located on the west of the existing waste stabilization ponds to be affected by the proposed artificial wetland



Figure 15: Other properties located on the northern side of the existing waste stabilization ponds also to be affected by the proposed artificial wetland

Mitigation measures will include:

- Carry out valuation and effect compensation to all Project Affected Persons (PAPs) as early as possible.

## 6.2.2 Construction Phase

### i. Loss of vegetation

Loss of natural vegetation for is expected for input of engineering design.



Figure 16: Vegetations available 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 keeping to minimize waste generated from such works
- Allocate a special area for petty business such as food stalls and provided with garbage bins.
- All solid wastes will be collected and transported to Buhongwa disposal site
- Assign Contractor's Environmental or Safety Officer the responsibility to ensure that the surroundings are kept clean
- All excavated spoils should be well managed through levelling or tipped into borrow areas which are no longer useful or in depressions.

### iii. Land scarring from Cut and fill materials and the resulting waste

Construction of the artificial wetlands will result into removal of the existing vegetation and other organic material in form of waste that require proper handling. Also cut and fill to build up the wetlands will result into movements of huge volumes of earth and corresponding wastes. All surfaces worked on at borrow sites and at wetlands sites will leave scars on the ground surface.

#### Mitigation measures

- Borrow materials to be used for construction will be collected from the identified borrow areas such as those used for road construction or new ones opened on agreement with the land owners.
- Once these borrow pits are no longer in use, they will be backfilled with the spoil. The edges of these pits will be smoothed to avoid posing risks to children. 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, these shall be purchased and this will be officially negotiated with villagers and/or village government in order to avoid conflict and the money received can be used to repair the scars on the earth surface.

**iv. Soil erosion**

Soils from disturbed surfaces on wetland areas 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 by soil erosion agents. This may also increase the rate at which the Lake is filling up with sediments.

Mitigation measures:

- Implementation of erosion control measures for example planting vegetation that hold soils together such as grasses, terracing in steep slopes, gully rehabilitation and control, leaving the buffer zone for the Lake free and undisturbed, applying rip - rap technique, and securing available vegetated land.

**v. Soil contamination during 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.

**vi. 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 working machines will stir the area leading into a cloud of 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.

**vii. Noise pollution during 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:

- Where the noise level is beyond 85 dB (A), ear muffs or plugs shall be provided to all those either operating or working within the construction site.
- Equipment shall be well maintained or fitted with noise silencers such as mufflers

- Select machinery yard not too close to residential premises
- During construction activities, the contractor should only work during the normal hours so that residents living close the site are not disturbed during sleeping and resting hours.
- Advance notice to local communities

**viii. Contamination of water from leakages of fuels and lubricants from the construction equipments**

It is likely that the water resources close to project area for example Rumala River which receives effluents from the WSPs will be contaminated with lubricants and fuel leakage during machines servicing and refuelling.

Mitigation Measures:

- During construction–machines will be properly serviced and checked to make sure that they do not leak (lubricants and fuels)
- No machine refuelling shall be carried out within 100 m of the water source
- 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 oil leakages on construction equipments away from the service bays
- Refuelling should be done at designated areas with hard concrete or impervious layer stand.

**ix. Child labour**

Presence of workmen in the project area will eventually be a readymade market for sale of all sorts of consumables. Most often these activities are done by parents sending their children to sell goods to the work force. Also children may abscond from schools to look for employment in the project site.

Mitigation measures

- Conduct sensitization/education and awareness to communities in relation to child labour and effects of truancy.
- Ensure that recognised casual labours are all hired through Butuja sub-ward government officers where leaders are aware of the status of every applicant in order to combat child labour during construction phase

**x. Hindrances/Disturbance to people going for fishing, fetching water and farms near Lake Victoria**

The project site is now used by the local community to access the lake, once the project is implemented; it is likely that the entire area will be fenced (see figure below) thus denying local community the access to the lake. Since the farms will be converted into wetland, then there will be no farms to access. Longer routes have to be made



Figure 17: Fencing around the existing waste stabilization ponds

Mitigation measures

- The existing path to the Lake should not be blocked by the contractor; if it is blocked, then alternative path should be constructed on agreement with the residents through and Butuja sub ward government leaders.

**xi. Nuisance to workers due to obnoxious smell from the WSPs**

Some parts of the waste stabilization ponds which receive raw sewage from houses or cesspit emptiers generate some objectionable smell that cannot be tolerated for so long. This kind of environment will be always be there for the workers.

Mitigation measures

- MWAUWASA will have to make sure that the WSPs are well maintained e.g. ensure de-clogging of the bar screens to ensure that there are no solids concentrating on one particular area.
- Workers will be provided with PPE

**xii. Spread of HIV/AIDS during project construction**

Potential socio-economic impacts resulting from an influx of job seekers into work place, including potential competition for resources and the delivery of social services, disruptions to social fabric, public health impacts such as the transmission of infectious diseases, HIV/AIDS and STDs, effects on women and economic impacts such as increase in price of goods. Since the project will be running concurrently with other projects in the City of Mwanza such impacts will be minimal as majority of people exhibit city life style different from the rural setup.

Mitigation measures

- To reduce the spread of STDs and HIV/AIDS there will be worker's sensitization programs for workers and local community. Community leaders will be sensitised to cooperate with the contractor for success of this program.

- Medical examination for newly recruited employees and periodic health examination of workers and treatment will be established to prevent epidemics in the construction site and possible transmission of communicable diseases including HIV/AIDS from workers to local population and vice versa as provided for in the National HIV/AIDS policy.
- A nearby health centre/dispensary will be assisted by the Contractor to provide health education, preventive health care and primary treatment of ailments and infectious diseases.
- HIV/AIDS sensitization programme shall be undertaken by the contractor to his workmen and nearby residents

### 6.2.3 Operation Phase

#### i. Obnoxious odour from the wetland

Short-circuiting on the waste stabilization ponds may lead into untreated waste water entering the wetlands. This will generally cause the wetland to work as primary or secondary treatment units.

#### Mitigation measures

- Performance of waste stabilization ponds will first be reviewed to ensure that there is no 'short-circuiting' that lead to wetlands receiving untreated water
- Since human settlements will be relocated away from the wetlands area thus the effect of obnoxious smell will be minimal except for the operation staff.

#### ii. Risk to life especially children and grown ups

Fishing and other sporting activities may be initiated by the children and grown-ups in the wetland as it is the case on some operating ponds in the country.

Also there may be a risk of

#### Mitigation Measures

- Proper wetland design with permanent fencing material to control children from entering the wetland
- Adoption of subsurface flow (SSF) wetland type will minimize this risk as children will never be in contact with surface water

#### iii. Increased breeding sites for disease vectors

Most often water bodies with stagnant waters and slow water level variations, less surface agitation offer favourable living conditions to disease vectors. Vegetation in the water body 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 water bodies such as the proposed artificial wetland.

#### Mitigation measures

- In case the subsurface flow (SSF) Wetland is adopted then risks associated with breeding sites for mosquitoes and other disease vectors will be minimized
- In order to reduce the risk of diseases transmission from disease vectors, vegetation around the wetland (in case of free water surface-FWS) will be kept low to allow water agitation by wind. This may reduce calm environment; ideal breeding sites for mosquitoes and other disease vectors.

- The community around the wetland shall be sensitized on use of mosquito nets and other control measures against mosquitoes.

**iv. Soil erosion**

Soil erosion may result from un-rehabilitated borrow areas and disturbed surface area around the wetland.

Mitigation measures

- Ensuring reinstatement of all borrow pits and other sources of materials and application of erosion control measures in all disturbed areas. This is a crucial aspect as project area is close to the shoreline, otherwise it may lead to degradation of the shoreline

**6.3 Health and Safety Measures for the Local Community during Operation of the Wetland**

Injuries and health problems associated with operation of the wetland will be reduced through the implementation of the community health, safety and first aid training programs. Community'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 between wetland operators and local community there will be sensitization programs to both operators and local communities. Community leaders will be sensitised to cooperate with the wetland operator for success of this program.

## 7. Assessment of the Significance of Impacts

### 7.1 Approach for assessment of significance

The general idea of construction of the wetland has been presented in the previous sections. The potential impacts of the proposed project have been listed under the previous section. These impacts are now analysed into different categories based on the stakeholders' views and perceptions, the consultants experience in undertaking Preliminary Environmental 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, whilst providing relevant information about the implications of the proposed construction of the wetlands. The assessment criteria are given on Table 3 below.

Table 3: 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	<p><b>High:</b> natural and/or social functions and/or processes are severely altered</p> <p><b>Medium:</b> natural and /or social functions and /or processes are notably altered</p> <p><b>Low:</b> natural and /or social functions and/or processes are negligibly or minimally altered</p>
Duration of Impact	<p><b>Short Term (ST):</b> 0-5 years;</p> <p><b>Medium Term (MT)</b> 5-10 years;</p> <p><b>Long Term (LT):</b> 15+ years</p>

### 7.2 Criterion used during evaluation

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

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



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

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

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

Environmental standards, objectives and targets to evaluate significance include:

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

The environmental significance was determined using an assessment matrix shown on Table 7.3, 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 4: Analysis of Environmental and Social Impacts

Environmental and Social Impacts	Analysis of Environmental and Social Impacts											Significance
					Duration					Extent or Spatial influence		
Description of Impacts	Direct	Indirect	Primary	Secondary	Short term	Medium	Long term	Reversible	Irreversible	Local	Regional	
<b>POSITIVE IMPACTS</b>												
<b>During Mobilization</b>												
Creation of employment opportunities	✓		✓		✓					✓		Medium
<b>During Construction</b>												
Creation of new businesses opportunities at the construction site e.g. Food vendors	✓		✓		✓					✓		Medium
Employment opportunities	✓		✓		✓					✓		Medium
<b>During Operation</b>												
Improvement in health and sanitation condition and reduction of water related diseases		✓		✓			✓				✓	High
Reduction of contamination of existing water resources and sources		✓		✓			✓				✓	High
<b>NEGATIVE IMPACTS</b>												
<b>During Mobilization</b>												
Land Loss (Relocation of properties)	✓		✓			✓				✓		Medium
Vegetation Clearance	✓		✓		✓					✓		Medium
<b>During Construction</b>												
Nuisance to labourers due to smell from	✓		✓			✓				✓		Medium

the WSPs												
Land scarring at borrow sites (cut and fill materials)	✓		✓		✓			✓		✓		Medium
Contamination of water due to leakages of fuels and lubricants from the construction equipments	✓		✓				✓	✓			✓	Medium
Poor air quality from dust and emissions around the construction site and material hauling routes	✓		✓		✓			✓			✓	Medium
Generation and poor disposal of solid wastes	✓		✓			✓		✓		✓		Medium
Generation and poor disposal of liquid wastes	✓		✓			✓		✓			✓	Medium
Noise pollution	✓		✓		✓			✓		✓		Medium
Social-cultural changes		✓		✓			✓			✓		Low
Soil erosion	✓			✓			✓	✓		✓		High
Involvement of child labour	✓		✓		✓			✓		✓		Low
Soil contamination during construction	✓		✓		✓			✓		✓		Low
Disturbance to people going for fishing, fetching water and farming	✓		✓				✓	✓			✓	High
Spread of HIV/AIDs and other communicable diseases	✓			✓		✓			✓		✓	Medium
<b>During Operation</b>												
Odour from the wetland	✓			✓			✓	✓		✓		Medium
Risk to life especially children	✓			✓			✓	✓		✓		
Landscape scars at un-rehabilitated borrow sites	✓			✓			✓	✓		✓		Medium
Increased breeding sites for mosquitoes and other disease vectors	✓			✓			✓	✓			✓	Medium

Table 5: Impact Assessment Matrix

Impact Activities during project phases	Mobilization Phase			Construction & Operation Phases							Demobilization phase		
	Land acquisition	Labour force hire	Transportation of construction Equipment	Site clearance & Camp Site construction	Fencing the site	Access roads construction	Construction of inlet and outlet structures	Filling with the filter material	Establishment of vegetation in the wetlands	Connection to WSPs and maintenance	Demobilization of Camp site	Reinstatement	Laying off labour force
<b>POSITIVE IMPACTS</b>													
Creation of employment opportunities	+1	+2	+1	0	0	0	0	0	0	0	0	+1	0
Creation of new businesses opportunities at the construction site e.g. Food vendors	0	0	+1	+2	+2	+2	+2	+2	+2	0	0	+1	0
Improvement in health and sanitation condition and reduction of water related diseases	0	0	0	0	0	0	0	+2	+2	+2	0	+2	0
Reduction of contamination of existing water resources and sources	0	0	0	0	0	0	0	+2	+2	+2	0	+2	0
<b>NEGATIVE IMPACTS</b>													
Land Loss	-2	0	0	-2	0	0	0	-3	0	0	0	0	0
Vegetation Clearance	0	0	0	-2	0	0	0	-2	0	0	0	0	0
Nuisance to labourers due to smell from the WSPs	0	0	0	0	-2	-1	-2	-2	-1	0	0	0	0
Disturbance, particularly land scarring at	0	0	0	0	0	-2	-2	-2	0	0	0	-1	0

borrow sites (cut and fill materials)													
Contamination of water due to leakages of fuels and lubricants from the construction equipments	0	0	0	-1	-1	-2	-2	-2	0	0	-1	-1	0
Poor air quality from dust and emissions around the construction site and material hauling routes	0	0	0	-1	-1	-2	-1	-2	0	0	-1	-1	0
Generation and poor disposal of solid wastes	-2	0	0	-3	-2	-2	-2	-2	0	0	-2	0	0
Generation and poor disposal of liquid wastes	-1	0	0	-1	-2	-1	-2	-2	-1	0	-1	-1	0
Noise pollution	-2	0	0	-2	-1	-2	-1	-1	0	0	-1	-1	0
Social-cultural changes	-2	0	0	-2	-1	-1	-2	-1	-1	0	-1	0	-2
Soil erosion	0	0	0	-2	-1	-2	-2	-1	0	0	-1	0	0
Involvement of child labour	0	0	0	-1	-1	-1	-1	-1	-1	0	-1	0	0
Soil contamination during construction	-1	0	0	-2	-1	-2	-2	-2	0	0	-1	0	0
Disturbance to people going for fishing, fetching water and farming	-1	0	0	-2	-2	-1	-1	-1	0	0	0	0	0
Odour from the wetland	0	0	0	0	0	0	0	0	0	-3	0	0	0
Risk to life especially children in wetland	0	0	0	0	0	0	0	0	0	-3	0	0	0
Landscape scars at un-rehabilitated borrow sites	0	0	0	0	0	-2	-2	-2	0	-2	0	0	0
Spread of HIV/AIDs and other communicable diseases	-1	-2	0	0	0	-1	-2	-2	-1	-1	0	0	-1
Increased breeding sites for mosquitoes and other disease vectors	0	0	0	0	0	-2	-2	-2	0	-3	0	0	0

**Key:**

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

## 8. Project Alternatives

### 8.1 Introduction

The EIA procedure requires 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 the Waste Stabilization Ponds as the wastewater to be polished is expected to flow from the existing waste stabilization ponds.

Alternatives considered include exact location and placement options, input and design, and do-nothing.

### 8.2 Option Analysis for the proposed Butuja artificial wetlands

Table 6: Options analysis for the proposed artificial wetlands

Options	Anticipated Impacts/ Environmental and socio-economic issues
<b>Option 1</b> South–west side of the waste stabilization ponds	<ul style="list-style-type: none"> <li>- There is limited space as the site is occupied by other waste water treatment facilities</li> <li>- The area has a natural water course which flows to lake Victoria</li> </ul>
<b>Option 2</b> The present location	<ul style="list-style-type: none"> <li>- Strategically located to minimise distance from the WSP to wetland and to the discharge point (the lake)</li> <li>- Lesser communities residing in the specific area</li> <li>- Wastewater will be conveyed by gravity</li> </ul>
<b>Option 3: Northern side of the waste stabilization ponds</b>	<ul style="list-style-type: none"> <li>- There are limitations of space as much of the area is occupied by houses that would need huge compensation sums</li> <li>- Waste water cannot flow by gravity otherwise more excavation will be required to allow flow by gravity</li> </ul>
<b>Option 5:</b> <b>Design/Treatment_Process</b> Changing the type of treatment process or plant e.g. going for <i>Combined Aerobic, Anoxic and Anaerobic Processes</i> which may involve Activated biofilter process, Trickling filter solids contact, biofilter activated sludge, series trickling filter and activated sludge	<ul style="list-style-type: none"> <li>- Installation and operation of these systems require relatively higher costs compared to the available financial plan for this project, however, such systems require small land area than the wetland does. Going for wetland becomes the affordable choice in terms of investment costs and operation.</li> </ul>
<b>Option 5</b> <b>No-project or Do –nothing</b>	<ul style="list-style-type: none"> <li>- The no-project or do-nothing option in this case would imply that the status quo of the environment would be maintained and that discharge of partially treated wastewater to the lake will continue to the detriment of Lake Victoria.</li> </ul>

Environmental BENCHMARK, EIA Consultants thus seconds the recommendation that the construction of the proposed wetland on the preferred present 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 of the receiving environment Lake Victoria*. Based on the discussion above, the preliminary environmental and social impacts assessment focused its findings on the identified preferred 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 (through LVEMP II) who will be assisted by the Designers and Supervisors during detailed engineering design and construction phases of the project. Then during the operation phase MWAUWASA the wetland operator, will cooperate with the technical staff from Ilemela District Council in ensuring that the commitment of the projects are observed. To minimize potential environmental and social negative impacts, the project will require the support of various institutions in the project area. Table 7 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 Ilemela 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 (REME) 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.

Table 7: Environmental and Social Management Plans

Environmental Impact	Indicator-mitigation target	Responsible for mitigation	Time Frame	Estimated Cost TZS
<b>Mobilization phase</b>				
Land Loss and relocation of project Affected persons	Limit the land loss to areas 6 ha	Contractor/ Supervising Engineer/ Mwanza City Council	Before construction commencement	As per Properties Valuation Report Estimated at 150,000,000
<b>Construction Phase</b>				
Vegetation loss through site clearance	Limit clearance to 6 ha	Contractor/ Supervising Engineer/Residents/ District Natural Resources or Forestry Officers	During mobilization phase i.e. before construction	1,500,000
Solid wastes generation	Sanitary measures practice at house level, Collect, segregate, compost, recycle etc of Waste generated during construction works.	Contractor/ Supervising Engineer/ Residents / District Health Officer	During construction works and operation activities.	750,000
Disturbance, particularly land scarring at borrow sites (cut and fill materials)	Reinstatement	Contractor/ Supervising Engineer/Residents/ District Natural Resources or Forestry Officers	Monthly During construction	700,000
Soil Erosion	Erosion control measures are put in place.	Contractor/ Supervising Engineer/ District Natural Resources or Forestry Officers / Residents	Monthly routine throughout project life	2,000,000
Soil Contamination	Both liquid and solid management and sanitary measures are sufficiently practiced	Contractor/Supervising Engineer/ District Environmental Management Officer	Weekly During wetland constructions and agricultural activities	800,000
Dust and air pollution from wetland and access road construction works	Water sprinkling, PPE, sound service, speed limit	Contractor/ Sup. Engineer/ District Environmental Management Officer	Weekly during construction	900,000
Noise pollution during civil work construction	Sound insulation	Contractor and Supervising Engineer/District Environmental Management Officer	During construction	800,000
Contamination of water due to leakages of fuels and lubricants from the construction equipments	Sound machinery maintenance, No refuelling near water source	Contractor/ Supervising Engineer/ District Environmental Management Officer	Monthly during wetland construction	1,400,000
Child labour	Sensitize communities	Contractor/Residents/ Community Development Officer	During Labour force hire and Monthly during	600,000

**Ministry of Water**

PEA for the proposed construction of Artificial Wetland at Butuja Sub-ward in Ilemela ward in Mwanza City

			construction	
Disturbance to people going for fishing, fetching water and farming	Contractor/ Supervising Engineer/ Residents	Contractor/ Supervising Engineer/ Residents / Community Development Officer	Daily routine	720,000
Nuisance to labourers due to smell from the WSPs	Proper maintenance of the WSP	MWAUWASA/Contractor/ Supervising Engineer/District Environmental Management Officer	Weekly during construction phase	600,000
Spread of HIV/AIDS and other communicable diseases	HIV Test Results/Community sensitization	Contractor/ Residents / District Health Officer	Monthly during construction	1,200,000
<b>Operation phase</b>				
Obnoxious odour from the wetland	Regular maintenance	MWAUWASA / District Environmental Management Officer	Weekly routine	900,000
Risk to life especially children and grownups in wetland	Sensitize the community	OSHA /MWAUWASA/ Residents	Twice a year during operation	1,000,000
Increased breeding sites for mosquitoes and other disease vectors	Increased mosquitoes/ use mosquito nets	Residents /Supervising Engineer/Health Officer	Monthly during operation	800,000

## 10. Environmental and Social Monitoring Plan

### 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 road'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 Ilemela 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 wetland 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.

Ilemela District Environmental Management Officer will be responsible for monitoring environmental impacts after construction of the wetlands. Ilemela 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 Officers and other sectoral officers in Ilemela District to provide the Regional Environment Office with environmental reports of the project implementation as part of the progress reports and annual environmental monitoring reports. The Regional Environment Office will be the link between the project and the National Environment Management Council and the Department of Environment under Vice President's Office.

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

The table below presents the preliminary costs for performing economic analysis of the road project for Environmental and Social Monitoring plan. The plan outlines the parameters that will require monitoring during construction and later operation of the wetlands, 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 8 below.

Table 8: Environmental Monitoring Plan

Impact/parameter to be Monitored	Sampling Area	Monitoring Method	Target Level	Responsible Organ	Time Frame	Estimated Costs (TZS) (For 6 Months)
<b>Mobilization phase</b>						
Land Loss and relocation of project Affected persons	All project		No property within the project area	Mwanza city Council	Before the Construction of the wetland starts	1,000,000
<b>Construction Phase</b>						
Vegetation loss	Wetlands area and access road	Vegetation clearance plans are according to necessary requirements	Vegetation loss limited to 6 ha	District Natural Resources Officer/DEM O	Once during vegetation clearance for access road and wetland site	500,000

<b>Solid and trash wastes generation</b>	Wetland construction site, camp site and access roads	Wastes collected and disposed off in appropriate places	Wastes generated	District Health Officer/ District Environment Management Officer	Weekly during construction phase	1,440,000
<b>land scarring at borrow sites (cut and fill materials)</b>	Quarry, sand and Borrow pit sites	Reinstatement done	All borrow areas reinstated	District Natural Resources Officer/DEMO	Monthly during construction	720,000
<b>Soil erosion</b>	Disturbed areas	Soil erosion control measures are put in place,	land not eroded	District Natural Resources Officer/DEMO	Monthly during construction	600,000
<b>Water/Soil Contamination</b>	Construction area, filling station and at washings, camp site	Water not contaminated e.g. with oils, grease, 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	2,000,000
<b>Dust/ air pollution during civil works construction</b>	Construction sites and access road	Control measures are in place	Emissions of CO, SO <sub>x</sub> , NO <sub>x</sub> , 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 monthly routine after start of construction	1,000,000
<b>Noise pollution during civil work construction</b>	Wetland 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 twice a month during construction	780,000
<b>Child labour</b>	Construction sites and Residents	Involvement of mature people as labourers during hiring	No child is employed in the project	Community Development Officer	During hiring of labour force and monthly during construction	1,250,000
<b>Disturbance to people going for fishing, fetching water and farming</b>	Residents, existing routes	Ensure their way to their works is free	No complain from the residents	Community development officer	Once after two months during construction	720,000

<b>Increase in HIV/AIDS cases</b>	HIV Test centres	Community sensitization	Number of Infection cases	District AIDS Control Coordinator/Community Development Officer	monthly during construction	1,800,000
<b>Health and Safety of employees and local community</b>	Wetland 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	600,000
<b>Nuisance to labourers due to smell from the WSPs</b>	Constructi on site	Regular maintenance exercised	No or little smell	DEMO	Twice a month during construction	720,000
<b>Operation phase</b>						
<b>Obnoxious odour from the wetland during operation</b>	Wetland and nearby residential areas	Regular maintenance exercised	no objectionable odour	DEMO	monthly during operation	1,200,000 for first year
<b>Risk to life especially children in wetland</b>	Wetland area, Residents	Wetland fenced with strong fence	No unauthorized access to the wetland	District Health Offer/ OSHA district office	Twice a months during operation	2,400,000 for one year
<b>Increased breeding sites for mosquitoes and other disease vectors</b>	Quarry, sand and borrow pit sites, Residential areas.	Community sensitized on handling water for domestic purposes and sleeping into mosquito nets	No or minimal infection	District Health Officer	Monthly during operation phase	1,200,000 for one year
<b>Poor health and safety of local community</b>	Reported incidents	Sensitization of community and labourers	No or minimal incidents	District Health Officer/OSHA District Office)	Monthly during operation	1,200,000 for one year
<b>Total Estimated Monitoring Costs, for Estimated Six Months of Construction</b>						<b>19,550,000</b>

## 11. Summary and Conclusion

The Preliminary Environmental Assessment (PEA) study for Butuja artificial wetland has been completed by describing the project characteristics and identifying and evaluating the impacts and proposing corresponding mitigation measures. The project beneficiaries are eagerly looking forward to the decision to be made by NEMC. If NEMC is satisfied that the wetland 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 preliminary field surveys to collect the environmental and social information and also discussed with the local authorities the environmental and social impacts of the wetland 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 concerns 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 Mwanza city as they expect to be connected to the water supply and sewerage services and therefore expect improvement of lake water as some of them directly utilize water from the lake without treatment.

There properties within the proposed project area and those likely to be affected by the project will be compensated to relocate and thus pave the way for the proposed works. There had been some delays in effecting compensation and some members of the community have no faith in the system. On health and safety grounds no persons are supposed to stay in the area earmarked for the waste stabilization ponds and that is why MWAUWASA and the City Council had initiated the process of evaluating the cost of the properties and compensation exercise was stalled due to lack of funds but the process is still on truck to compensate the remaining persons so that they can relocate somewhere else.

It is worth recording that the last valuation was done in 2002, when there were only 198 households in the project area. Presently there are about 600 households; indicating that there are more households which were established after the first valuation and of course there those who took advantage of the silent situation and continued to sell land parcels as if nothing had happened. Of course there are innocent PAPs who are still waiting for their fair compensation to vacate the area. Still, there nothing that cannot be rectified at this stage bearing in mind that the proposed project will have immense benefits to the local community, the nation and the EAC members states at large, through improvements of the waters of the Lake Victoria.

Most of the project negative impacts can be mitigated to the acceptable levels with the proposed measures. Cooperation between the team players LVEMP II, MWAUWASA, the project Contractor, Mwanza City Council authorities, as well as Butuja sub ward government authorities in the project area will be required in management and monitoring the mitigation measures. Monitoring of environmental and social impacts will be important in ensuring sustainable operation of the wetlands. The Butuja artificial wetland construction is estimated to cost a sum of Three Hundred Thousand (300,000) US Dollars. A budget of about USD 13,000 has been estimated to facilitate monitoring of the proposed artificial wetlands.




## Reference

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2. LVEMP/MWAUWASA: Mwanza Water Supply and Sanitation: Impact Survey Report. May, 2004
3. TACNE: Background Studies for the Preparatory Phase of the SoCR. June, 2009
4. MCC: Mwanza City Council Socio-economic Profile, 2012
5. URT: 2002 Population and Housing Census- General Report January, 2003
6. URT: MKUKUTA- Annual implementation Report, 2009/2010 November, 2010
7. URT: National Environmental Action Plan, NEAP (1994)
8. URT: The National Environmental Policy, NEP (1997)
9. URT: The National Land Policy (1996)
10. URT: National Water Policy (2002)
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14. URT: Women and Gender Development Policy (2000)
15. URT: The Environmental Management Act (EMA), Cap 191 (No. 20 of 2004)
16. URT: Environmental Impact Assessment and Audit Regulation of 2005
17. URT: Land Act Cap 113, (No. 4 of 1999)
18. URT: The Land (Forms) Regulation 2001
19. URT: The Village Land Act, Cap 114 (No. 5 of 1999)
20. URT: The Land Acquisition Act, Cap 118 of 2002
21. URT: Land Use Planning Act No. 6 of 2007
22. URT: Forest Act No. 14 of 2002
23. URT: Wildlife Conservation Act, No. 5 of 2009
24. URT: The Mining Act No. 5 of 1998
25. URT: The Water Resources Management Act No. 11 of 2009
26. URT: Water Supply and Sanitation Act No. 9 of 2009
27. URT: The Engineers Registration Act No. 15 of 1997
28. URT: The Contractors Registration Act No. 17 of 1997
29. URT: The Occupational Health and Safety Act No. 5 of 2003
30. URT: The Surface and Marine Transport Regulatory Authority Act No. 9 of 2001
31. URT: The Roads Act No. 13 of 2007
32. URT: Local Government (District) Authorities Act No. 7 of 1982

## Appendices

### Appendix 1: Copy of the letter for Screening Decision



**NATIONAL ENVIRONMENT MANAGEMENT COUNCIL (NEMC)**  
**BARAZA LA TAIFA LA HIFADHI NA USIMAMIZI WA MAZINGIRA**

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P.O.Box 63154  
Dar es Salaam  
Tanzania

In reply please quote:  
Ref: **NEMC/179/1/Vol. 30/16**  
Date: **31/07/2012**

✓ Project Manager,  
Lake Victoria Environmental Management Project (LVEMP),  
P.O. Box 9153,  
Dar es Salaam.

**RE: ENVIRONMENTAL IMPACT ASSESSMENT (EIA) ON THE PROPOSED CONSTRUCTION OF ARTIFICIAL WETLANDS AT BUTUJA SUB-WARD IN ILLEMELA WARD, MWANZA REGION**

The above caption refers.

We acknowledge receipt of your letter dated 16<sup>th</sup> July, 2012 attached with a Registration Form and the Project Brief as an application for Environmental Impact Assessment clearance of the above mentioned project.

The Council has reviewed the submitted documents and found that the proposed project may not require full EIA study based on its nature and function. Therefore the Council recommends that you undertake a Preliminary Environmental Assessment (PEA) for this project. Please adhere to the requirements of the EIA and Audit Regulations, 2005 and submit 10 copies of the PEA report to NEMC and ensure that all relevant permits are appended. In addition, among other things the PEA should address the following proposed project related issues:

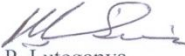
- i. The status of the proposed site (6ha), focus on the current land use planning, acquisition/ownership and suitability for the above project,
- ii. The status of water discharged from the existing stabilization pond, stand on the laboratory analysis of its physical and chemical characteristics and
- iii. For all impacts to be identified as a result of this PEA its corresponding Environmental Management and Monitoring Plans should be in place in the report.

---

**All correspondence should be addressed to the Director - General**

Please do not hesitate to contact us through Tel. No.0714508171 in case you need further clarification on this matter.

Yours Sincerely,



K.P. Luteganya






**For: Director General**

**Cc:** Environmental BENCHMARK Consulting Engineers,  
P.O. Box 77222,  
**Dar es Salaam.**

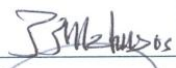
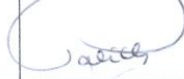




**Appendix 2: Officials consulted in Ilemela district**

Stakeholders' Consultation for Environmental and Social Impacts Assessment for LVEMP II Works for Construction of Artificial Wetlands and Sewerage Facilities in Mwanza City and Solid Waste Disposal Facility and Charco Dam in Magu District

OFFICIALS CONSULTED

NO.	DATE	NAME	POSITION	MOBILE NO./EMAIL	SIGNATURE
1	27/6/12	Chesencis Joseph	Asst RAS	0787174317 mark_gmcs@yahoo.com	
2	27/6/12	Mark George	Asst. Towns	0715464836	
3	27/6/12	ELIAS M. MAKORI	DAS	0754-415458 NYAMAGARA	
4	27/6/12	DAVID LYAMONKI	DAS - ILEMELA	0767363426	
5	27/6/12	PETER K. MICHAEL	ALTARAPA-ILEMELA	0754327550	

OFFICIALS CONSULTED

NO.	DATE	NAME	POSITION	MOBILE NO. /EMAIL	SIGNATURE
1	22/6/2012	Jito Jeremiah Makaya	AS CY	0756145400	
2	22.6.2012	Patrick Karangwa	City Economist	0786-274472	
3	22.06.2012	Francis Mnkabenga	City Agric. officer	0784410615	
4	22/6/12	Eng. T. P. Bwiti	AGCE	0765210710	
5	22-06-12	Sumu Samuel	AgCCBD	0758-381440	
6	22/06/2012	SIMON NZAGI	ENVIRONMENTAL PLANNER	0754-031149	

**Appendix 3: Attendance to consultation meeting**

MKUTANO WA WADAU WA MRADI WA UJENZI WA  
ARDHI OEVU MTA A WA BUTUJA, WILAYA YA ILEMELA

MAHUDHURIO

NA	TAREHE	JINA	MTAA	SAHIHI
01	22/06/2012	MATOKE JACISON	BUTUJA	
02	- " -	Soma Butinbo	- " -	
03	- " -	KICHONKE MWIZA	- " -	AC
04	- " -	ALLY MKAMB	- " -	
05	-	Said Swaleh	= " -	
06	- "	EZILONI MAREGES	- " -	
7	- "	SAMUEL MKIITA	- " -	
8	- "	RASHID SADIKI	- " -	SADIKI
9	- " -	NDBI MIINDI	- " -	
10	1 - " -	Mwai Msone	- " -	Msone
11	1 - " -	MONGANYI MACHOMBA	- " -	
12	1 - " -	Paulo Kama	- " -	
13	1 - " -	FELICIAN KAZALI	- " -	
14	- " -	MUGANYIZI J. KAINDOA	- " -	
15	- " -	TASO JACKISON MSIBA	- " -	
16	- "	HASHIM OMARY	- " -	
17	"	LENARO FRANCIS	- " -	
18	"	MAKOYE KATEMI	"	
19	"	BYARUGABA G. MUSUNGU	- "	
20	"	NYAMBOLE SHASHI	- "	
21	"	CHAU SIKU IBULAHIMU	- "	
22	- "	EMMANUELE M. OMARE	- "	
03	- " - " -	BEUS M. CHARLES	" - " - " -	



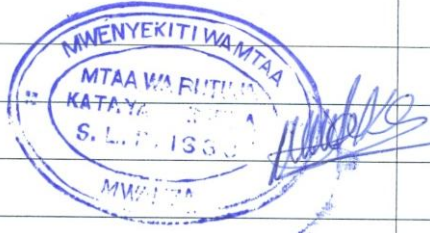
MAHUDHURIO

NA	TAREHE	JINA	MTAA	SAHIHI
23	24/6/12	SKIMSON J. SUNGURA	-11-11-	<i>[Signature]</i>
24	11-11-11-11	GRUCE J. MOSHI	-11-11-11-	<i>[Signature]</i>
25	-11-11-11-	LUCIA D. MUSAU	-11-11-11-	<i>[Signature]</i>
26	-11-11-11-	KINIFRIED M. DRUD	-11-11-11-	<i>[Signature]</i>
27	-11-11-11-	KATHEMA M. KATHEMA	-11-11-11-	<i>[Signature]</i>
28	)) ))	VEDANCE MKOME	)) ))))	<i>[Signature]</i>
29	)) ))))	MAGESA MSONGE	)) ))))	<i>[Signature]</i>
30	11 - -	ISSAYA - SIRAS	11 1111	<i>[Signature]</i>
31	11	MASUNGU Juma	111	<i>[Signature]</i>
32	=11=	KATUTE EDWARD	=11=	<i>[Signature]</i>
33	-	Immanuel MBITI	-	<i>[Signature]</i>
34	-	STEPHANO MJUNGU	-	<i>[Signature]</i>
35	--	BERTA LUBINZA	-	<i>[Signature]</i>
36	--	KARIB WILLIAM	-	<i>[Signature]</i>
37	--	DICKSON K. MALA	-	<i>[Signature]</i>
38	--	CHARLES M	-	<i>[Signature]</i>
39	---	ALEX MICHAEL	-	<i>[Signature]</i>
40	---	MARIA ROBARA	-	<i>[Signature]</i>
41	---	WINI ROBARA	---	<i>[Signature]</i>
42	---	CATHERINE MBEBA	---	M.S
43	---	AMINA SAIDI	---	A.S
44	-	MAYEKA KALEMELA	---	<i>[Signature]</i>
45	-	NEEMA YODAH	-	<i>[Signature]</i>




MAHUDHURIO

NA	TAREHE	JINA	MTAA	SAHIHI
46		SALIMA SAIDI		Shukri
47		ELIVANIA S. DISMAS		Elivania
48		MALIETHA ZABRONI		MALIETHA
49		MKIDHWA JUSTO		M. JUSTO
50		MKWAYA MAGAI		M. MAGAI
51		MONICA KIGINGA		M. KIGINGA
52		JOSEPH BABELI		Babeli
53		ELEST JONGO		E. Jongo
54		SALIMON-DISMAS		Salimon
55		MWITA		Mwita
56		MAGO - COSTA		Mago
57		DEBORA SOSTENES		D.S
58		ZAWADI RASHIDI		Z
59		NGONOJI NYUMBU		Ngonoji
60		NICHOLAUS KATUKULA		Nicholaus
61		AJCSA MAJULA		Ajcsa
62		MONICA MATIKU		MONICA
63		KURWA MATAYO		KURWA





Appendix 4: Minutes of Consultation Meeting

MUHTASARI WA WADAU WA MRADI WA UTENZI  
WA ARDHI DEVI ENEO LA BUTUJA, KATA YA  
ILEMELA, MKOA WA MWANZA 24-06-2012  
ATH = MRADI WA MAJI TAKA.  
Mkazi alifungua kikao muda wa saa 10:15 jiani kwa  
kumwacha mwanachizi, na kumwambusha wageni  
kutoka Dar.  
Akiwa kiongozi wa msafari: Kujitambusha na  
kumwambusha wenzie.  
Baada ya utambusho huo kiongozi wa msafari  
Bw Mkanu akiwa maelezo moja kwa moja:  
Sisi ni watu wa mazingira hizi wa Victoria  
na tunashughulika hizi na miradi ya maji  
taka na kwa hazi miradi hii hii hii  
Iyona, n.k  
Sisi tunafanya tathmini ya miradi wa mazingira  
tunachoturota hii ni mazungumzo na majaji  
kwa ajiri ya tathmini ya miradi wa mazingira  
hizi ni mimi mtakachoaathirika na miradi hii  
au mtafaidika na mimi hii miradi hii.  
maswali,  
MKAKOBA: Upande wa kushoto au wakuba ni  
upande upi tonaorderes?  
Jibu: - Ni Upande wa Kulia.  
Swali: Kumbusu miradi hii athani kulwa tutakao  
tupata ni magongira ya mrepaka hizi kupinduzi  
Ryabukoba mzungu. Maana ya kuhitiza Swali la  
kwanza, kwanza kulia au kushoto maana  
ake ni kushoto ni Butuj's A \* Kulia ni  
Butuj's B'  


MSI BA:

Taka ni wakumbushe wataaramu wetu  
Kuna mita 70 kusheni ya wakuviji  
nataka wataaramu mtuambie

KATEMI GURUBA:

Kama watachukus baadhi ya eneo  
wengine tutaishi vipi

MATHESHA:

Yale matwawa yanatathini sana  
ni kama unamfungia mtu choozi  
arafu unamunira unatathika  
mimi. Swala hili sikwali kama  
wanataji eneo wachukus lote  
wataharishia kwa hiyo  
haluta kubanana na swala la  
matwawa.

MATKOYE:

wanataji yale maeneo wataji  
dika na mimi

AKSON MASURA:-

Kwani miongelea eneo la chini  
na wakati wanasathika ni sisi  
wakazi wa Butuja na Turisema  
havi chukuni na mipaka tuondoshe  
wote ili wabaki na eneo lao.

STANSON SUSHURA:

T sisi tunataka eneo lote  
Sio vipande vipande



DICSONI MAFIKA:

MWATHUWASA.

Huko mwanzo watu wa ~~MWATHUWASA~~ walikuwa wakija kwa Stairi hii hii na matokeo yake mpaka Sasa kila sekta au mredhi huna kuja.

MASIBU:

- = Pamoja na kumeka fe fesi hatutawea kuathiri maswala ya Ukuu. Na wataerumu wakija watekwa makini na Swala hii.
- = ~~Tafarii~~ Tafarii, Swala hii ni Swala la wataerumu wachuja na kuone ni ramua jani watafanya.
- = Swala la kuondoa kijiji hiziwa haiwerekani kwa Sababu ni gramu muna isipokuwa wote watakar ghusu ndio watakatorewa Sio wote.
- = MWATHUWASA. Ndio maana wanataw awamu kwa awamu kwa Sababu ya uweto na kichumi.

= WANANCHI:



Baada ya ~~Ma~~ Majibu ya Kiungori wa MSAJAJA kutiithisha wananchi. Wananchi wahodoke kwa ishara ya kutiithika wa majibu yao. Kwa hiyo wao rasumb waondorowe wote Sio kifande kifande Miki aihainishe kikeo munde wa Saa 11:50 PM kwa khusumba wananchi mawe na ukuanishia hadi munde ukijitea.