

**ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT FOR  
THE PROPOSED IMPROVEMENT OF IGOMA – KISHIRI –  
BUHONGWA ROAD (14 KM) IN IGOMA, KISHIRI, LWAHNIMA  
AND BUHONGWA WARDS AND REHABILITATION OF  
MIRONGO RIVER (5.9 KM) IN NYAMAGANA, MIRONGO,  
PAMBA, MBUGANI, MABATINI, MAHINA AND MHANDU  
WARDS IN MWANZA CITY, MWANZA REGION**

**FINAL REPORT**

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## ACRONYMS

AADT	Average Annual Daily Traffic
AAS	Atomic Absorption Spectrophotometer
AIDS	Acquired Immune Deficiency Syndrome
A.M.S.L	Above Mean Sea Level
BATNEEC	Best Available Technology Not Entailing Excess Cost
BMU	Beach Management Unit
CBD	Convention on Biological Diversity
CBO	Community Based Organization
CITES	Convention on International Trade in Endangered Species
CRB	Contractors Registration Board
CTC	Care and Treatment Clinic
CoI	Corridor of Impact
DoE	Division of Environment
EHS	Environment Health and Safety
EIA	Environmental Impacts Assessment
EIS	Environmental Impacts Statement
EMA	Environmental Management Act
EMP	Environmental Management Plan
ERB	Engineering Registration Board
ESIA	Environmental and Social Impacts Assessment
ESF	Environmental and Social Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
EWURA	Energy, Water Utilities Regulation Authority
GoT	Government of the United Republic of Tanzania
GRM	Grievance Redress Mechanism
GRC	Grievance Redress Committee
HBC	Home Based Care
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
IA	Implementing Agency
LGA	Local Government Authority
MCC	Mwanza City Council
MWAUWASA	Mwanza Urban Water Supply and Sanitation Authority
NACP	National AIDS Control Programme
NEMC	National Environment Management Council
NGO	Non-Governmental Organization
NSGRP	National Strategy for Growth and Reduction of Poverty
OP	Operational Policy
PAs	Protected Areas
PAPs	Project Affected Persons
PEDP	Primary Education Development Programme
PLHAS	People Living with HIV/AIDS
PMTCT	Prevention of Mother to Child Transmission
PO-RALG	President's Office, Regional Administration and Local Government
PwD	People with Disability
RoW	Right of Way
SACCOS	Credit Co-operative Societies
SIA	Social Impacts Assessment

SEP	Stakeholder Engagement Plan
STDs	Sexually Transmitted Diseases
STIs	Sexual Transmitted Infections
TAC	Technical Advisory Committee
TACAIDS	Tanzania Commission for Aids
TACTIC	Tanzania Cities Transforming Infrastructure and Competitiveness Project
TANESCO	Tanzania Electric Supply Company Ltd
TFS	Tanzania Forest Services Agency
ToR	Terms of Reference
TRL	Tanzania Railway Corporation
TTCL	Tanzania Telecommunication Company Ltd
ToR	Terms of Reference
WB	World Bank
VCT	Voluntary Counselling Treatment
WHO-GPA	World Health Organization Global Programme on AIDS

## EXECUTIVE SUMMARY

### **The Final Environmental and Social Impact Statement for the Proposed Improvement of Igoma – Kishiri – Buhongwa Road (14 Km) in Igoma, Kishiri, Lwahnima and Buhongwa Wards and Rehabilitation of Mirongo River (5.9 Km) in Nyamagana, Mirongo, Pamba, Mbugani, Mabatini, Mahina and Mhandu Wards in Mwanza City, Mwanza Region**

**Proponent:** Mwanza City Council

**Proponent's Contact:** City Director,  
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Mwanza.

#### **Background Information**

Administratively, Mwanza city was established in 2000 and became among the eight councils of Mwanza Region. Besides being a headquarters of the city council, it is also the headquarters of Mwanza region, a major Tanzanian port of Lake Victoria and a business centre of a Great Lake Region and East Africa Community. The city can easily be reached by Ugandans and Kenyans through Lake Victoria and by road to countries of Rwanda, Democratic Republic of Congo and Burundi.

#### **Land Area and Land Use Pattern**

Mwanza City has a total area of 256Sq. Km, divided into land area covering 173Sq.Km, equivalent to 67.6 percent of total area and 83.0 Sq.Km, equivalent to 32.4 percent of water area, mostly dominated by lake Victoria. Comparing with other councils in Mwanza region, Mwanza city possess smallest area covered only a percent of the total area (25,233.0 Sq. Km) of the region. Looking at ward level, Mkolani is the largest ward possessing 19 percent of city area followed by Buhongwa (17.6 percent) and Igoma (16.0 percent). The least wards in terms of area are Pamba and Mirongo covered on 0.8 percent of city area each.

#### **The TACTIC Projects in Mwanza City**

Mwanza City Council as the Implementing Agency (IA) is part of the LGAs which will be executing the WB finance project through TACTIC. The objective of the proposed TACTIC project is to strengthen urban management performance and deliver improved basic infrastructure and services in participating urban local government authorities. At its core, the project aims to promote economic development of Tanzania's cities and towns and its enabling infrastructure. Investments and technical assistance under the project are intended to promote urban development that is productive, inclusive and resilient. The project will support 45 urban Local Government Authorities (LGAs) spread geographically across all regions of Tanzania, ranging in population from 26,402 to 416,442 (2012), divided into three tiers based on population and growth rate. Mwanza City Council is grouped in Tier 1 as among the 12 larger, fast-growing LGAs.

The TACTIC project will provide funding to cover for the following projects in Mwanza City Council:

(i) Rehabilitation of Mirongo River (to mitigate flooding in the downstream): Mirongo river is located in Mwanza City Council, passing through seven wards of Nyamagana, Mirongo,

Pamba, Mbugani, Mabatini, Mahina and Mhandu. The river is approximated to have a length of 5.9km. The proposed river dimensions are 20 m width with 10 m buffer from each site; however, this is not the existing case, the buffer varies from 5 to 10 m from each side due to some structures (there are some multi-story building).

(ii) Construction of Igoma-Buhongwa Road 14 km, part of the ring road that is economically critical for Mwanza: The project components in Mwanza comprises of the construction to bitumen standard of the 14 km Igoma – Kishiri – Buhongwa road. The project will also involve construction of storm water drain along Mirongo river. The proposed Igoma – Buhongwa road 14Km project passes through Igoma ward, Kishiri ward, Lwahnima ward ending at Buhongwa ward. This road form part of the ring road that is economically critical for Mwanza city by linking the Mwanza city centre to Shinyanga road and Mwanza to Musoma Road.

The proposed projects are in accordance with the Mwanza city strategic plan as well as the Government vision and other strategic documents to reduce and eventually end poverty in coming few decades.

### **Environmental and Social Assessment**

This environmental and social finding covers for the upgrading of Igoma – Buhongwa Road and the Mirongo river. The detailed environmental and social impact assessment study was conducted in accordance with the Environmental Impact Assessment and Audit Regulations of 2005 as amended in 2018 and the World Bank environmental and social framework (ESF). While the ESF acknowledges country’s capacity in managing environmental risks and impacts, the country regulations on the other side give mandate to NEMC to oversee the ESIA process, which culminates with an award of the ESIA certificate by the Ministry responsible for Environment. The ESIA certificate is among the prerequisite approvals required before the project takes off. This project will need this approval before it is implemented.

The environmental and social study is also conducted as part of the design works where by some of the mitigation measures will be rectified during finalization of the designs.

### **Stakeholder Participation**

Different groups of people in the project areas participated fully in the public consultative meetings during the Study, the categories of interested people who participated are as exemplified but not limited to the following;

- Mwanza City Council Office (City Director with all the project teams)
- Mwanza Water Supply and Sanitation Authority (MWAUWASA)
- TANESCO Mwanza Regional Office
- Association of drivers using the proposed road
- Nyamagana ward and mtaa leaders (for Mirongo river),
- Mirongo ward and mtaa leaders (For Mirongo river),
- Mbugani ward and mtaa leaders (for Mirongo river),
- Mabatini ward and mtaa leaders (for Mirongo river),
- Igoma ward and mtaa leaders (for the road),
- Kishiri ward and mtaa leaders (for the road),
- Buhongwa ward and mtaa leaders (for the road),
- Communities along the project areas in Nyamagana, Mirongo, Mbugani, Mabatini wards (for Mirongo river) and Igoma, Kishiri and Buhongwa wards (for the road).

The following issues were raised by stakeholders,

**-Relocation of the Utilities/Infrastructure;** The project site has utilities crossing or running parallel TANESCO, MWAUWASA, TRL/SGR and TTCL were consulted regarding this. It was observed that the cost for relocation of the infrastructures is incurred by developer (Mwanza City Council) and must be part of the budget for the proposed project. These authorities/companies must be involved from the initial stages of the project

**-Soil/Water Pollution;** during construction, the contractor should be careful with the rivers/streams.

**-Compensation of affected properties;** Even though the proposed road and the Mirongo river shall maintain the same existing alignment and some few By-pass the stakeholders are still worried that some properties might be affected especially those located along Mirongo river which some are as close as within 1 meter. Therefore, the developer must be ready to compensate all the affected properties including houses, business places, planted trees, farm, crops and land as directed by Tanzania laws where necessary.

**-Priority for employment** opportunities for labourers should be given to local within the project areas to reduce conflicts among the community

**-Health and safety issues** are key during construction due to close proximity of the houses to the construction areas. Houses along Mirongo river are very close to the river banks and communities living there might be at risk.

### **Potential Significant Environmental and Social Impacts**

The development of infrastructure in unplanned settlements can cause a wide range of environmental and social impacts on a number of receptors. The impacts are of both positive and negative nature. The significant environmental and social impacts identified include,

#### ***Impacts during pre-construction phase;***

##### ***Positive***

- Job creation and increased income
- Improvement of local economy mainly through taxes

#### ***Impacts during construction phase;***

##### ***Positive***

- Job creation and increased income to local communities
- Increase revenue to the government

##### ***Negative***

- Disruption of other infrastructure
- Soil erosion and instability of slopes
- Increased water and soil Pollution
- Noise, vibration and air pollution
- Safety and health risks
- Increase possibility of road accidents
- Loss of Vegetation
- HIV / AIDS among workers and students since the construction will be conducted while classes are ongoing
- GBV / SEA

#### ***Impacts during operational phase;***

##### ***Positive***

- Improved Transport & economy of the people
- Improved community life and services
- Reduced traffic congestion
- Increase property value
- Increase road accidents

### **Project alternatives**

Three alternatives considered in this study including no project alternative, alternative sites and alternative designs. The no project alternative disqualified because choosing that alternative shall mean to remain with the status quo (without project) and losing all the benefits of the project. The selection of project sites (roads) and sub project done through a rigorous process that involved technical personnel and the proposed communities while observing the laid down criteria for selection of local roads. Alternative design looked at the advantages and disadvantages of using asphalt concrete over other pavement materials and covered channels over open channels. Asphalt concrete and covered channels seemed to have more advantages than the other alternatives considered.

### **Recommendations and plan for Mitigation**

Many of the mitigation measures put forward are nothing more than good engineering practice that adhered to during all the project phases. The major mitigation measures to observe include;

- i. The TANESCO, MWAUWASA, TRL/SGR and TTCL shall be involved from the early stages of these project so as to have an integrated planning.
- ii. Early notice shall be given to the community before any service interruption
- iii. Unnecessary ground clearance and sensitive re-alignments shall be avoided.
- iv. Lined drainage channels at sensitive terrains shall be provided to control speed and volumes of storm-water.
- v. The discharge points shall be carefully chosen to avoid erosion of arable land and creation of gullies.
- vi. Refueling of plant or transfer of materials should not be carried out near water bodies, and any local spillage to soil should immediately be remedied.
- vii. Good house keeping shall be practiced within material storage compounds or vehicle maintenance yards where the possibility of spillage is great. This can easily be done by provision of Spill tanks and Secondary containment at vehicle maintenance yards.
- viii. The nuisance of noise, vibration and dust will be transient and good work practice can minimize them. In addition, these impacts are already being experienced due to the existing road segments.
- ix. Watering should be practiced regularly at all active work sections along the road and at all quarries and borrow sites for the protection of workers. In addition, sections of road heavily traversed by construction vehicles should also be regularly wetted.
- x. Appropriate working gear (such as nose, ear mask and clothing) and good camp management shall be provided.
- xi. The road design shall take account of safety concerns especially at human habitation crossings e.g. installation of bus stops at settlement centres.
- xii. Traffic management plan shall be incorporated in the designs to include for example details of signs, markings, intersection layouts, access restrictions, bus stops, crossings, footpaths etc.
- xiii. Adequate number of waste bins shall be provided at the constructio sites site
- xiv. Close supervision of earthworks shall be observed in order to confine land clearance within the proposed new coridor of impact boundaries.



- xv. The road design shall try as practicable to offset the route so as to avoid felling all big trees that take many years to grow or other flora of outstanding importance.
- xvi. Installation of proper road signs and regular inspections for their presence
- xvii. Installation of speed control devices like humps
- xviii. Installation of pedestrian lanes at human settlement crossings

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

The options to minimize or prevent the identified adverse social and environmental impacts as well as a monitoring plan suggest in this report and are contained in the ESMP. Many of them are based on good engineering practices. The Environmental and Social Management Plan (ESMP) presents the implementation schedule for the proposed mitigation measures to both environmental and social impacts as well as planning for long-term monitoring activities. The ESMP also includes the associated environmental costs needed to implement the recommended mitigation measures. The engineering designs have already included some of the mitigation measures recommended in this report. Additional recommendations provided in the ESMP to enable the proposed facilities become more environmentally friendly. The implementation steps will involve the Contractor, the Resident Engineer, NEMC, some utilities provide such as TTCL, TRL/SGR and TANESCO, and the local communities at large.

### **Decommissioning**

As decommissioning is not anticipated to take place in the remote future, the specific conditions for mitigation are generally inherently uncertain. In view of this, specific mitigation measures pertaining to environmental impacts of decommissioning works cannot be proposed at the moment with a reasonable degree of certainty. A detailed decommissioning plan that takes environmental issues into consideration shall be prepared by the developer prior to the decommissioning works. Should it be done, decommissioning may entail change of use (functional changes) or demolition triggered by change of land use.

### **Summary and Conclusion**

The proposed upgrading of Igoma-Kishiri-Buhongwa road and the Mirongo river project is planned to be implemented in Mwanza City Council, Mwanza Region. The project has enormous socio-economic benefits to Mwanza City Council and the nation at large. The project as such, entails minimal adverse environmental impacts of which adequate mitigation measures have been proposed and incorporated in the project design. It is, therefore, concluded that the proposed project will entail no significant impacts provided that the recommended mitigation measures are adequately and timely implemented. The identified impacts will be managed through the proposed mitigation measures and implementation regime laid down in this ESIA. Mwanza City Council is committed in implementing all the recommendations given in this ESIA and further carrying out the environmental auditing and monitoring schedules.

## **ACKNOWLEDGEMENT**

The Mwanza City Council wishes to convey heartfelt thanks and appreciation to all stakeholders who in one way or other supported the completion of this work. Thanks very much all of you. Special thanks to all wards and mitaa leaders where the upgrading of Igoma-Buhongwa road and Mirongo river will be implemented for provision of relevant information and for their prompt assistance during the fieldwork. Last but not least we thank the Village, Vitongoji's and Wards leaders for their cooperation and assistance. The proponent would like to thank Dar Alhandasah JV Don Consult's team of Consultants, Ms. Rosemary C. Nyirenda (Lead Environmental Expert), Ms. Magdalena L. Mlowe (Environmental Specialist), Dr. Lillian G. Mulamula (Ecologist), Dr. Edmund Temba (Legal Expert), Italius Kavishe (Social and Gender Expert) and Dorcas Ephraim (Economist) for their great contribution in this project.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background Information

Administratively, Mwanza city was established in 2000 and became among the eight councils of Mwanza Region. Besides being a headquarters of the city council, it is also the headquarters of Mwanza region, a major Tanzanian port of Lake Victoria and a business centre of a Great Lake Region and East Africa Community. The city can easily be reached by Ugandans and Kenyans through Lake Victoria and by road to countries of Rwanda, Democratic Republic of Congo and Burundi.

#### 1.1.1 Land Area and Land Use Pattern

Mwanza City has a total area of 256Sq. Km, divided into land area covering 173Sq.Km, equivalent to 67.6 percent of total area and 83.0 Sq.Km, equivalent to 32.4 percent of water area, mostly dominated by lake Victoria. Comparing with other councils in Mwanza region, Mwanza city possess smallest area covered only a percent of the total area (25,233.0 Sq. Km) of the region. Looking at ward level, Mkolani is the largest ward possessing 19 percent of city area followed by Buhongwa (17.6 percent) and Igoma (16.0 percent). The least wards in terms of area are Pamba and Mirongo covered on 0.8 percent of city area each.

#### 1.1.2 Administrative Units

Administratively, Mwanza city council comprises one division, namely Nyamagana, 18 wards and 175 streets. However, it is important to note that, although the law identify Mwanza as a city, still has both rural and urban settings resulted to have both urban and rural wards. The urban wards comprise with Mbugani, Butimba, Mkuyuni, Mabatini, Nyegezi, Nyamagana, Igoma, Pamba, Mkolani, Mirongo, Isamilo and Igogo. The rural wards formed by Lwanhima, Kishiri, Buhongwa, Mhandu, Mahina and Luchebele (**Table 1**).

**Table 1:** Land areas by ward in square kilometer

Ward	Land Area		Water Area		Total Area	
	Sq.km	Percent	Sq.km	Percent	Sq.km	Percent
Buhongwa	31	68.9	14	31.1	45	17.6
Lwanhima*	n.a	0.0	0	0.0	0	0.0
Mkolani	35	0.0	13.54	27.9	48.54	19.0
Luchebele*	n.a	n.a	0	0.0	0	0.0
Butimba	12.91	61.7	8.01	38.3	20.92	8.2
Nyegezi*	0	0	0	0.0	0	0.0
Igogo	10	43.5	13	56.5	23	9.0
Mkuyuni	4	20.6	15.45	79.4	19.45	7.6
Pamba	2	100	0	0.0	2	0.8
Nyamagana	2	16	10.5	84.0	12.5	4.9
Mirongo	2.09	100	0	0.0	2.09	0.8
Isamilo	5	37.0	8.5	63.0	13.5	5.3
Mabatini*	0	0	0	0.0	0	0.0
Mbugani	4	100	0	0.0	4	1.6

Ward	Land Area		Water Area		Total Area	
	Sq.km	Percent	Sq.km	Percent	Sq.km	Percent
Mahina	24	100	0	0.0	24	9.4
Mhandu*	0	0	0	0.0	0	0.0
Igoma	41	100	0	0.0	41	16.0
Kishiri*	0	0	0	0.0	0	0.0
<b>Total</b>	<b>173</b>	<b>67.6</b>	<b>83</b>	<b>32.4</b>	<b>256</b>	<b>100</b>

\* These are new wards their areas are included in their former wards

*Source: City Director's Office, Land and Natural Resources Department, Mwanza City, 2016*

## 1.2 The TACTIC Projects in Mwanza City

Mwanza City Council as the Implementing Agency (IA) is part of the LGAs which will be executing the WB finance project through TACTIC. The objective of the proposed TACTIC project is to strengthen urban management performance and deliver improved basic infrastructure and services in participating urban local government authorities. At its core, the project aims to promote economic development of Tanzania's cities and towns and its enabling infrastructure. Investments and technical assistance under the project are intended to promote urban development that is productive, inclusive and resilient. The project will support 45 urban Local Government Authorities (LGAs) spread geographically across all regions of Tanzania, ranging in population from 26,402 to 416,442 (2012), divided into three tiers based on population and growth rate. Mwanza City Council is grouped in Tier 1 as among the 12 larger, fast-growing LGAs.

The TACTIC project will provide funding to cover for the following projects in Mwanza City Council:

- Upgrading of Mkuyuni Fish Market
- Rehabilitation of Mirongo River (to mitigate flooding in the downstream)
- Construction of Igoma- Buhongwa Road 14 km, part of the ring road that is economically critical for Mwanza

The proposed projects are in accordance with the Mwanza city strategic plan as well as the Government vision and other strategic documents to reduce and eventually end poverty in coming few decades.

The PO-RALG has awarded Dar Al-Handasah (Shair and Partners) to provide consultancy services for carrying out the Feasibility Study, Urban Design, Detailed Engineering Design, Environmental and Social Due Diligence for the above-mentioned proposed project for Mwanza City. The consultancy also includes carrying out Environmental and Social Impact Assessment (ESIA) for the proposed upgrading of Mkuyuni Market, rehabilitation of Mirongo River and construction of Igoma – Buhongwa Road. Therefore, Dar Al-Handasah Commissioned Rosemary C. Nyirenda, a register and licensed Environmental expert to carry out the ESIA for these subprojects.

## 1.3 Environmental and Social Assessment

This environmental and social finding covers for the upgrading of Igoma – Buhongwa Road and rehabilitation of Mirongo river. The environmental and social study was conducted in accordance with the Environmental Impact Assessment and Audit Regulations of 2005 as

amended in 2018 and the World Bank environmental and social framework (ESF) from January to December 2022. While the ESF acknowledges country's capacity in managing environmental risks and impacts, the country regulations on the other side give mandate to NEMC to oversee the ESIA process, which culminates with an award of the ESIA certificate by the Ministry responsible for Environment. The ESIA certificate is among the prerequisite approvals required before the project takes off. This project will need this approval before it is implemented. The environmental and social study is also conducted as part of the design works where by some of the mitigation measures will be rectified during finalization of the designs.

#### **1.4 General Objective of the environmental and social assessment**

Mwanza City Council undertook Environmental and Social Impact Assessment for its proposed Igoma – Buhongwa road and the drain at Mirongo river to comply with the country law and the WB Environmental and Social Framework (ESF) and ensure that the project does not cause significant negative environmental and socio-economic impacts. The ESIA has been conducted in accordance with the guidelines laid down by the Environment Management Act (EMA, 2004). Part IV of the ESIA Regulations GN No. 349 7 of 2005 which provides the general objectives for carrying out ESIA, among others. The list objectives include the following: -

- To ensure that environmental considerations are explicitly addressed and incorporated into the development of decision-making process;
- To anticipate and avoid, minimize or offset the adverse significant biophysical, social and relevant effects of developmental proposal.
- To protect the productivity and capacity of natural systems and ecological processes which maintain their functions.
- To promote development that is sustainable and optimizes resources' use and management opportunities.

##### **1.4.1 Specific objectives of the environmental and social impact assessment include:**

- (i) To establishment the baseline information on both natural and the built environment including socio-economic activities of the proposed project area.
- (ii) To ensure that environmental legal requirements are met by Mwanza City Council prior and during implementation of the project.
- (iii) To identify, predict and evaluate anticipated environmental and socioeconomic impacts, both beneficial and adverse, of the proposed investment.
- (iv) Proposing effective measures to mitigate the negative impacts during the construction and operation of the entire project that aim at eliminating or minimizing the potential negative impacts and promote positive ones.
- (v) Outlining an environmental and social management plan to manage the impacts.
- (vi) Preparing environmental and social monitoring plan to keep track of the environmental performance of the project.

#### **1.5 Methodology**

The methodology employed in conducting the ESIA study is in line with the Environment Impact Assessment Regulations, 2005, GN No.349 of 2005. The study was undertaken based on developed checklist and complimented by past experience of similar ESIA studies. 8 Observations of the proposed project site and surrounding habitats were made and literature

reviewed was done through reading of reports and documents. The study adopted the following approach to get the findings:

- (i) Identification of stakeholders (Stakeholder Analysis)
- (ii) Communicating with stakeholders (market vendors, neighborhoods).
- (iii) Involvement of stakeholders The ESIA study applied different participatory methods to involve all the concerned stakeholders. One on one interviews were held with every identified stakeholder. Every individual was given an opportunity to give his/her comments freely. Every detail of each stakeholder's comment was considered important and noted down.
- (iv) Data collection Both primary and secondary data has been collected through field to obtain an overview of the existing situation at the site. Appraisal of physical and environmental conditions of the project site and areas that might be impacted by the project - soils, hydrology, flora and fauna, appraisal of land use and assessment of other relevant socio-economic parameters

## **1.6 Rationale of the ESIA**

To ensure that no segment of the population is adversely affected and the physical cultural resources given the due attention, this ESIA study was carried out to identify constraints, risks and mitigation measures on the project affected communities. The ESIA provides input to the feasibility study and design proposals of the investments. The ESIA findings and recommendations contained in this report incorporated in the overall project design specifically assist in the development of mitigation and enhancement measures of the identified risks, opportunities and impacts.

It is a legal obligation of any developer to conduct an ESIA of his/her envisaged development proposal meant implemented in Tanzania. The principal legislation guiding ESIA undertakings in Tanzania is the Environmental Management Act (EMA), Act No.20 of 2004 (Cap. 191). For matters pertaining to ESIA, the EMA operationalized through the ESIA and Audit Regulations of 2005. According to these regulations, the National Environment Management Council (NEMC) manages the ESIA process (screening and review of statements), which culminates by an award of an Environmental Certificate to the proponent by the Minister responsible for Environment. The Council (i.e., NEMC) determines the level of the ESIA study after the project has registered by the proponent. This procedure has followed in the execution of this ESIA study. The ESIA is also conducted in accordance to the WB Environmental and Social Standards (ESS) as stipulated in the WB Environmental and Social Framework (ESF) where ESS 1 directs on the importance of conducting environmental assessment such as ESIA for a new project to predicts the potential social and environmental impacts and their mitigation measures.

### **1.6.1 Scope of Work**

The scope of this work outlined in the ToR (**Appendix I**) and includes;

1. To identify, predict, evaluate and mitigate the significant environmental impacts (positive and negative)
2. To identify key social issues relevant to the project objectives, and specify the project's social development outcomes
3. To determine magnitude of adverse environmental and social impacts and identify the safeguards instruments as per Country laws and regulations
4. To predict and assess in quantitative terms as far as possible, the impacts from changes brought about by the project on the baseline environmental conditions.

5. To establish the mitigation measures that are necessary to avoid, minimize or offset predicted adverse impacts and, where appropriate incorporate these into Environmental and Social Management Plan (ESMP)
6. To identify stakeholders who affected and carry out stakeholder analysis to determine their role in achieving social development outcomes.
7. To inform, consult and carry out dialogues with stakeholders on matters regarding project design alternatives, implementation of environmental and social mitigation measures and to provide recommendations on project design that may require adjustments in project design
8. Provide an environmental and socio-economic profile of the population and available infrastructure facilities for services and community resources.
9. To assess the capacity of the implementing agencies and the mechanisms for implementing safeguard instruments, and recommend capacity building where appropriate
10. To develop monitoring and evaluation mechanism to assess effectiveness of mitigation measures including, resettlement outcomes during and after project completion.

## **1.7 Approach and Methodology**

### **1.7.1 Study Team**

In order to properly address the environmental issues, a team of experts participated in undertaking the ESIA Study. The experts were Environmentalist, Sociologist and Valuer.

### **1.7.2 Desk Study**

A desk study was done by collecting documents and other relevant information on the project. Documents, reports, and records were reviewed to obtain existing secondary data and relevant information relevant to Mwanza City Council where the project is implemented. The information gathered during the study included the project's WB framework documents such as the ESMF, SEP, ESHSG and RPF reports, Mwanza City Council background reports, socio-economic and investment profiles, development plans and project's preliminary reports. The secondary data included various national policies and legislation, national strategies and plans that are applicable to the proposed project at Mwanza City Council.

### **1.7.3 Socio-Economic Baseline Survey**

A socio-economic survey was undertaken with the overall objective of assessing the socio-economic impact of the project on people's lives and their properties. This involved an assessment of the living conditions of people, with the likelihood of being affected by project in terms of income earnings and expenditures and occupation. This study also captured the insights of different stakeholders about the potential positive and negative impacts once the project is implemented. In terms of data collection procedure, the study used both quantitative and qualitative methods. The study therefore combines the advantages of both approaches of research to enable a detailed understanding of the socio-economic context and impacts of the project.

The sampling for the qualitative data was purposive, inclusive and participatory. A range of approved data collection tools were used during interviews. Secondary data were also used to document the legal framework underpinning the implementation of the project. Secondary sources of inform action include desk review of relevant documents, review of land laws and

regulations on land and other existing policies regarding constructions in Tanzania. In addition, questionnaires were administered to the neighbors and other stakeholders in order to get their views on the potential impacts of the project to both natural and human environment.

#### 1.7.4 Public and officials Consultations

These conducted through meetings with major stakeholders of the project. During the fieldwork, consultative meetings held with City, ward and Vitongoji/Villages / hamlet authorities in the project areas within Mwanza City Council. More than 5 public consultation meetings with communities were conducted. The comments received and issues rose from these public participation exercises incorporated into the report and used in determining mitigation measures for the project.

#### 1.7.5 Observation and Expertise Judgment

Observation method was used by the team to gather data on physical characteristics and human activities in the project host community. Field observations formed an integral part of the study as experts gathered considerable information through observations. This involved site visits and recording the situation on the ground. Observation was a key to establish the exact location of the project site, shape, size, terrain and soil type. Also, the neighborhood characteristics were assessed in terms of nature of properties dominating the area, their sizes and type, tenure, dominant owners, uses, and others. Observations were also used as a tool for validating the facts that were gathered through interviews and questionnaires.

### **1.8 Project Impact Assessment**

Superimposing project elements/activities onto the existing social and environmental natural conditions has identified the potential environmental impacts of the proposed road development. The checklist method used to identify the impacts. Further, the environmental impact matrix method has been adopted to predict impacts of major concern. A key guiding assumption in this study is that the project will be designed, constructed, operated and maintained with due care for safety and environmental matters using current and practical engineering practice and/or Best Available Technology Not Entailing Excess Cost (BATNEEC). The implementation schedule of the mitigation measure summarizes in the Environmental Management Plan (EMP).

The environmental assessment undertaken in close interact engineering, planning and design team. In this process, environmental impacts evaluated for various alternatives. Several project alternatives considered including that of not implementing the project. The fundamental environmental protection strategy and environmental considerations influencing engineering design incorporated. However, reasonable regard to technological feasibility and economic capability were taken into account. *Inter alia*, the assessment entailed the following:

#### 1.8.1 Collection of Baseline Data

The collection of baseline data was conducted subsequent to defining the scope of the ESIA. These data allow the study team to determine whether more detailed information on environmental conditions at the development site and its surroundings are needed, where such information can be obtained, and how. Both primary and secondary data collected. Primary data collected by direct measurement, observations and using semi-structured interviews with respective and targeted parties (as explained in the previous section). Secondary data obtained from various relevant sources of information such as Municipal



profiles, wards and streets reports, education and health reports and many other official and non-official documents.

### 1.8.2 Review of Policies, Legal and Institutional Framework for Environmental Management

This allowed the study team to update and enhance their understanding of National policies, legislation and institutional arrangements for environmental management in Tanzania and relevant international procedures to ascertain the optimal management of impacts.

### 1.8.3 Impact Identification and Evaluation

The Upgrading of Infrastructure cause a wide range of environmental and social impacts on a number of receptors. The ESIA identify these impacts for the purposes of mitigating the adverse ones or enhancing the benefits. Impact *identification* is a process designed to ensure that all potentially significant impacts are identified and taken into account in the ESIA process. A number of 'tools' are available to assist in impact identification. The simplest, and most frequently used, are *checklists* of impacts, although *matrices*, *network diagrams* and *map overlays* are also commonly used. In this ESIA a *matrix* were used. The matrix consists of a horizontal list of development activities against a vertical list of environmental factors. Thus it identifies impacts by methodically checking each development activity against each environmental consideration to ascertain whether an impact is likely to occur. Taking a step further, the ranking in all phases (mobilization, construction and demobilization/ decommissioning) signified the magnitude of each and combined phases. As a result the more the score illustrated the severity the impact the road project or section has. The following factors were used to ascertain the significance of the impacts;

#### ***General***

- Magnitude
- Extent
- Non-conformity with environmental standards
- Level of public concern
- Social impacts resulting from environmental change
- Scientific and professional evidence concerning:
  - Resource loss/ecological damage
  - Negative social impacts
  - Foreclosure of land and resource use options
  - Environmental loss and deterioration
  - Probability and acceptability of risk
  - Environmental sensitivity

#### ***Ecological***

- Reduction in species diversity
- Habitat loss, degradation or fragmentation
- Affecting threatened, rare and endangered species
- Impairment of ecological functions

#### ***Social***

- Displacement of people
- Human health and safety
- Decline in important local resource

- Loss/gain of valued area
- Disruption of community livelihoods
- Demands on services and infrastructure
- Public concern
- Political concern

The above factors were used to create six criteria which were used to determine the significance of the impacts in the Matrix these include;

**-Spatial Scale-** The spatial dimension encompasses the geographical spread of the impacts regardless of whether they are short term or long term. **Table 2** describes the ratings used in the Simple Matrix as far as spatial scale is concerned.

Table 2: Spatial Rating

International (I)	Trans-boundary
National (N)	Within country
Regional (R)	Within Region
Local (L)	On and adjacent to site

**-Temporal Scale-** Temporal boundaries refer to the lifespan of impacts. **Table 3** describes the ratings used in the Simple Matrix.

Table 3: Temporal Rating

Short-Term (ST)	During construction
Medium-Term (MT)	Life of project
Long –Term (LT)	Residual impacts beyond life of project

**-Reversibility of the impact-** Every impact was checked if its effect can be reversed or not. Letter R was used to denote reversible impacts while IR was used to denote Irreversible impacts

**-Cumulative Impacts-** These are Impacts that cause changes to the environment that are caused by an action in combination with other past, present and future human actions. **Table 4** show types of cummulative impacts;

Table 4: Types and Characteristics of Cumulative Impacts

Type	Characteristic	Example
Time crowding	Frequent and repetitive effects	Forest harvesting exceeds rate of re-growth
Time lags	Delayed effects	Bioaccumulation of mercury
Space	High spatial density of effects	Numerous small mining enterprises

crowding		on river
Cross-boundary	Effects occur away from the source	Atmospheric pollution and acid rain
Fragmentation	Change in landscape pattern	Fragmentation of habitat by agriculture
Compounding effects	Effects arising from a multiple sources or pathways	Synergistic effect of POPS in humans and rivers
Indirect effects	Secondary effects	Forest areas opened up as a result of new highway
Triggers and thresholds	Fundamental changes in system functioning	Climate change

**-Residual Impacts-** These are long term impacts which go beyond the lifetime of the project in other words Residual impacts refer to those environmental effects predicted to remain after the application of mitigation suggested by the ESIA i.e. they are non-mitigable.

**-Timing-** During which phase of the construction is the impact likely to occur. The phases included Mobilization, Construction, Demobilization and Operation.

#### *Identifying Mitigation and Management Options*

The options for dealing with identified and predicted impacts were considered after comprehensive evaluation. This enabled the study team to analyze proposed mitigation measures. A wide range of measures have been proposed to prevent, reduce, remedy or compensate for each of the adverse impacts evaluated as being significant. Analysis of the implications of adopting different alternatives was done to assist in clear decision-making.

### **1.9 Structure of the Report**

This report is presented in accordance to the format of the Environmental Impact Assessment and Audit Regulations, 2005 and its amendment of 2018 and the World Bank's Environmental and Social Framework (ESF) on the Content of an Environmental Assessment Report. It is presented as follows:

- i. Acknowledgement
- ii. Executive Summary
- iii. Table of Contents
- iv. List of Figures
- v. List of Tables
- vi. List of Acronyms
- vii. Project Background
- viii. Project Description
- ix. Legal and Institutional Framework
- x. Baseline Information
- xi. Stakeholder's Consultation and Participation
- xii. Assessment of Impacts and Identification of Alternatives
- xiii. Impact Mitigation and Enhancement Measures
- xiv. Environmental and Social Management Plan

- xv. Environmental Monitoring Plan
- xvi. Cost Benefit Analysis
- xvii. Decommissioning and Closure
- xviii. Summary and Conclusions
- xix. References
- xx. Appendices

The appendices, containing some key primary information collected during the study attached at the end of this report. Generally, the report structure flows in conformity with that specified in the ESIA and Audit Regulations of 2005 for Conducting ESIA. The purpose of this ESIA study is to foresee all environmental, social and economic effects of the proposed project design before the project come into the actual implementation. The study therefore has addressed the social, economic, and environmental issues associated with the project and provided relevant mitigation plan to prevent or minimize adverse impacts and enhance the positive ones.

## **CHAPTER TWO**

### **PROJECT DESCRIPTION AND ACTIVITIES**

#### **2.1 Description of the Proposed Projects**

The project will focus on the Improvement of Igoma – Buhongwa road and the construction of the storm water drain at Mirongo river.

##### **2.1.1 Rationale for the Project**

The project will assist the community along the project and nearby community to interact easily hence increase their income, the project also will result into the introduction of other new business along the project line, reduce the travel time as well as access to social services.

Though Compensation is inevitable; Igoma – Buhongwa road is an important road for the city, to ease traffic congestion, to facilitate solid waste transportation to Buhongwa, serve significant number of communities, reduce flooding. The construction of Mirongo river storm water drain will reduce floods due to climatically changes and increase of human activities, the river over flows and causes major impacts to communities and other structures (roads) constructed under TSCP.

#### **2.2 Project Description**

##### **2.2.1 Project Location**

Mwanza City, is a port city and capital of Mwanza Region on the southern shore of Lake Victoria in north-western Tanzania (**Figure 1**). With an estimated urban population of 1,182,000 in 2021, it is Tanzania's second largest city, after Dar es Salaam. It is also the second largest city in the Lake Victoria basin after Kampala, Uganda and ahead of Kisumu, Kenya at least in population size. Within the East African community, Mwanza city is the fifth largest city after Dar, Nairobi, Mombasa, and Kampala. It is slightly ahead of Kigali, Kisumu, and Bujumbura in the population of city proper limits. However, in terms of infrastructure, Kigali and Kisumu cities are way ahead of Mwanza. Mwanza city is also the capital city of Mwanza Region.

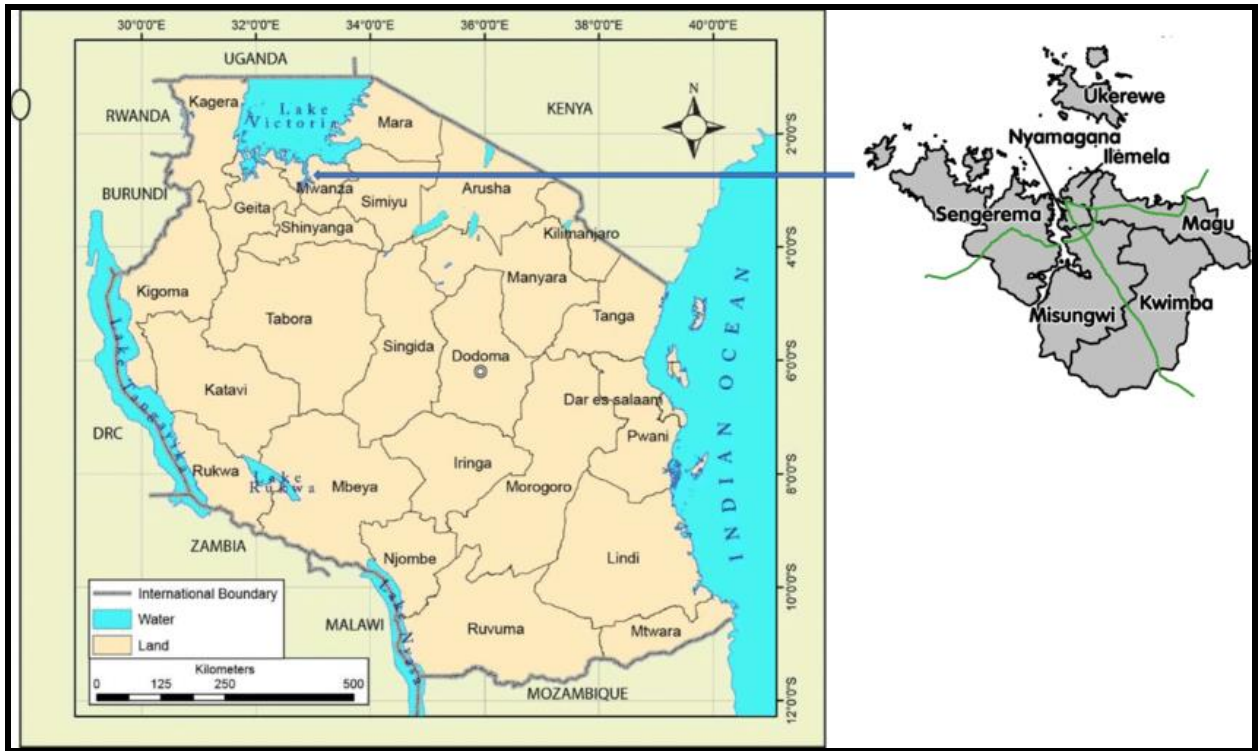


Figure 1: Map of Tanzania showing Mwanza region and its districts.

### 2.2.2 Description of the Project Components

The project will have two components, upgrading of the Igoma – Kishiri – Buhongwa road (**Figures 2**) and the construction of the main drain along Mirongo river (**Figures 3**).

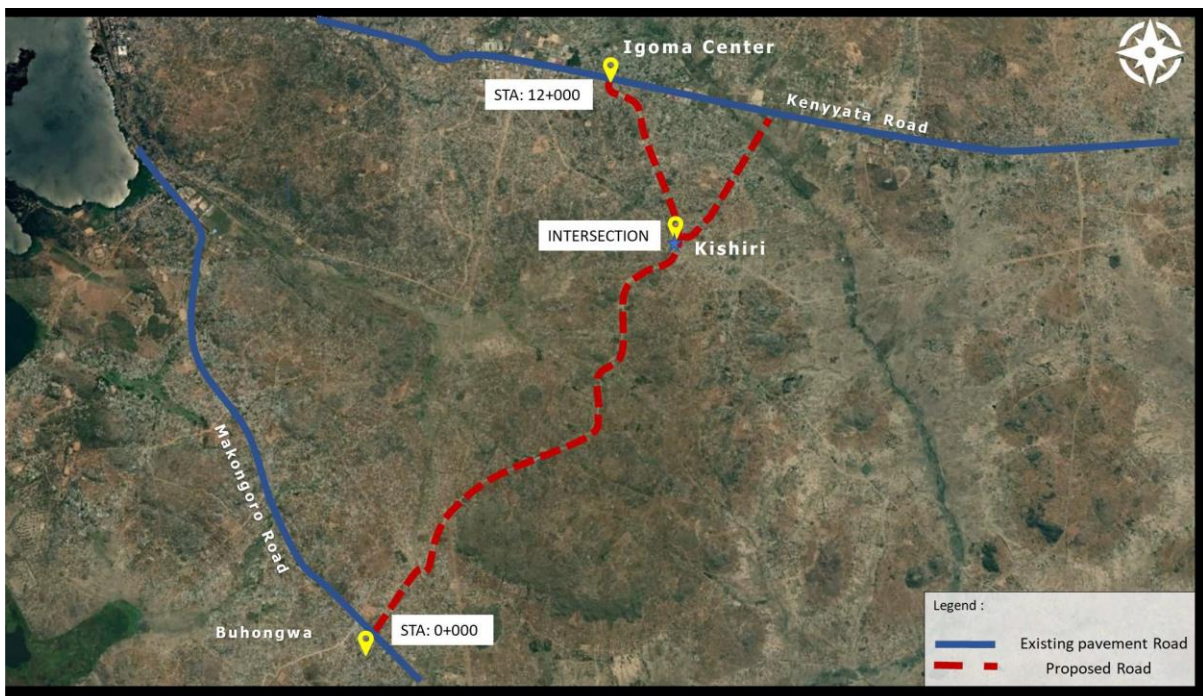


Figure 2: Map showing Igoma – Kishiri – Buhongwa Road



Figure 3: Map showing Mirongo river flood plains

### 2.3 Project Component 1: Construction of Igoma – Kishiri – Buhongwa road (14 km)

The proposed project components in Mwanza City comprises of the construction to bitumen standard of the 14km Igoma – Kishiri – Buhongwa road. The project will also involve construction of storm water drain along Mirongo river. The proposed Igoma – Buhongwa road 14km project passes through six Mtaa in Igoma Ward, six Mtaa in Kishiri Ward, five Mtaa in Lwahnima Ward and ending at Buhongwa Ward where it cuts across three Mtaa. The six Mtaa in Igoma Ward are Igoma Kati, Mkapa, Shamaliwa A and B, Dr. Shein and Mwembeni. The six Mtaa in Kishiri Ward include Kishiri A and B, Ndofo, Ihushi, Mbugani and Kanindo. The five Mtaa in in Lwahnima Ward are Kageye, Kagera, Semba, Igwambiti A and B. The three Mtaa in Buhongwa Ward Nyaruhama, Buhongwa Mashariki and Miti Mirefu. are This road forms part of the ring road that is economically critical for Mwanza city by linking the Mwanza city centre to Shinyanga Road and Mwanza to Musoma Road. The proposed road to be constructed are near sensitive areas which are mostly human settlements, businesses, farms as well as utilities such as TANESCO poles and water pipes which may be affected during project implementation.

#### 2.3.1 Project Right of Way for Igoma – Kishiri – Buhongwa Road

According to the master plan that was prepared for this road during feasibility study or design; Buhongwa to Kishiri right of way is 50 m from center line of the road, Kishiri to Igoma right of way is 20 m from center line of the road and Kishiri to Ukwoju right of way is 20 m from center line of the road. At Kishiri center the will road connect another major road so a roundabout might be needed. The land where the proposed road will be constructed on the existing road corridor which is owned by the government. However, there are few houses and businesses that encroached the RoW (**Figure 4**). The surveys done during the Resettlement Action Plan (RAP) and Valuation (**Appendix IV**) revealed that there are 57

PAPs that whose property will be affected hence removed prior implementation. These PAPs shall be compensated accordingly by Mwanza City Council following the guidelines for the Tanzanian government and World Bank.



Figure 4: Businesses and structures along Igoma – Kishiri – Buhongwa road.

### 2.3.2 Existing situation along Igoma – Kishiri – Buhongwa road

The proposed project area is currently used as road corridor. Currently, there is an existing rough road which will be improved since during rainy season, the part of the roads floods and becomes muddy and slippery making it to access while during dry season the roads are dusty hence affecting people in the areas. However, along the corridor, there are various land uses such as residential, commercial, utilities like TANESCO poles and water pipes, and peri-urban agriculture. Also, there are varieties of business activities taking place at the edge of the corridor such as Mama lishe and bodaboda (**Figure 5**).



Figure 5: Utilities and other existing infrastructures along Igoma – Buhongwa road.

The proposed use of the project area is the upgrading of Igoma – Kishiri – Buhongwa 14 km road to bitumen standard. This is an important road for the city as it will ease traffic congestion to the city center, reduce flooding, and serve a significant number of communities as will link Mwanza city centre – Shinyanga road and Mwanza – Musoma road. It will also improve solid waste management and cleanliness of the city. Construction of this road will increase value of land and houses around Buhongwa, Kishiri and Igoma centers. The major



land uses along the proposed road corridor include commercial building (trade), residential, peri-urban agriculture, petty trading, etc.

### 2.3.3 Terrain and vegetation type along Igoma – Kishiri – Buhongwa Road (Landscape and soil type)

The proposed Igoma – Kishiri – Buhongwa road terrain is characterized by undulating gentle slope and sand-loam soil. The proposed road will be constructed in the urban environment whereby vegetation along the road is largely dominated by planted trees such as pines, eucalyptus, wattles, mango trees and grasses. Also, there is vegetable gardens, banana and pawpaw plants, and small maize farms.

## 2.4 Project component 2: Rehabilitation of Mirongo River

Mirongo river is located in Mwanza City Council, passing through seven wards of Nyamagana, Mirongo, Pamba, Mbugani, Mabatini, Mahina and Mhandu. It cuts across several Mtaa in these wards which includes: Nyamagana Mashariki Mtaa in Nyamagana Ward. The three Mtaa in Mirongo Ward are Uhuru, Mission and Utemini. Then cuts across Pamba A Mtaa in Pamba Ward; Uhuru and Mission Mtaa in Mbugani Ward; Majengo Mapya, Mabatini Kaskazini, Nyerere A and B Mtaa in Mabatini Ward; Mwananchi, Susuni, Mahina, Mahina Kati and Kagomu Mtaa in Mahina Ward. The rehabilitation ends at Temeke, Isegeng'he B, Mahango and Mhandu Mtaa in Mhandu Ward. The river is approximated to have a length of 5.9 km. The proposed river dimensions are 20 m width with 10 m buffer from each site; however, this is not the existing case, the buffer varies from 5 to 10 m from each side due to some structures (there are some multi-story building). There are a number of PAPs whose properties will be affected by the project and may have to be removed while others will need to be protected (**Appendix IV**). Mwanza City Council shall be responsible to ensure that the PAPs are rightfully compensated and protected following the Tanzanian and World Bank guidelines. Mirongo River itself is a sensitive area passing through sensitive areas which include human settlements that may require special attention during the rehabilitation activities.

### 2.4.1 Existing situation along Mirongo river

Currently, Mirongo river is used for sand mining. There are households which discharge wastewater directly to the river. Also, around Mabatini area, shoe traders use the river for cleaning their shoes (second hand shoes) before selling them to their customers (**Figure 6**). There is a car wash that uses river water to clean the cars. Mwanza city council wants to improve Mirongo river and reduce unwanted human activities in order to mitigate flooding in the downstream by removing siltation on the river. The city council also intend to beautify the areas along the river banks for recreational purposes and create income from the fees that will be collected. Mirongo river terrain is characterized by gentle slope and sand soil.



Figure 6: Sand mining and car wash along Mirongo river

#### 2.4.2 Land use along Mirongo river

River is a natural resource owned by the government. However, there are residential houses that may require compensations which are owned by individual people. Most of them are squatters who encroached the river. There are about three (3) multistorey commercial buildings. More investigations on the status of title deeds shall be conducted in the subsequent consultations. The land uses of the neighboring areas include Port, business buildings such as GSM warehouse, Mwanza Water Supply and Sanitation Authority (MWAUWASA), Bank of Tanzania (Mwanza Branch), Medical Stores Department (MSD-Mwanza), dispensary, settlements (residential houses), shops, salon, petty businesses (Art paintings, Maasai traditional medicine shops), cargo vehicles parking, mama lishe and car wash (**Figure 7**). Also, there is blocks making business and sand mining. Mirongo river is mostly surrounded by unplanned settlements whereby the houses have been constructed along the river banks some of them above the river bank especially at areas opposite MSD, around Kanoni Bridge, Mabatini and Buzuruga.



Figure 7: Mirongo River and its neighbouring features

### 2.4.3 Vegetation type along Mirongo river

Mirongo river is located in the urban environment whereby vegetation along the river banks is largely dominated by planted trees such as palms, pines, eucalyptus, wattles, mango trees and grasses. Also, there is vegetable gardens, flower nurseries, banana and pawpaw plants, and small maize farms (**Figure 8**).



Figure 8: Vegetation on the downstream of Mirongo river where it enters the Lake Victoria

## 2.5 Project Designs

The proposed construction of Igoma – Kishiri – Buhongwa road and rehabilitation of Mirongo river shall be designed to be accommodated in the proposed project areas. These subprojects shall follow the construction rules and regulations in accordance with Tanzania Government specifications and the planning regulations.

### 2.5.1 Igoma – Kishiri – Buhongwa road

The road cross sections were taken to fit within the provided R.O.W, as an attempt to avoid encroaching the existing buildings. The road cross section is two-way two lane with lane width 3.75m, parking lane 2.4m, Krebs will be provided along all edges of the road. Krebs are used on all types of low-speed roads to assist with storm water drainage, delineate between the edge of carriageway and the pedestrian environment, control of access and the control of traffic flow and safety. Also, bus layby will be provided at suitable intervals and where needed. **Figure 9** show the cross section with parallel parking that can be used in the residential and commercial areas while **Figure 10** show the cross section without parallel parking.

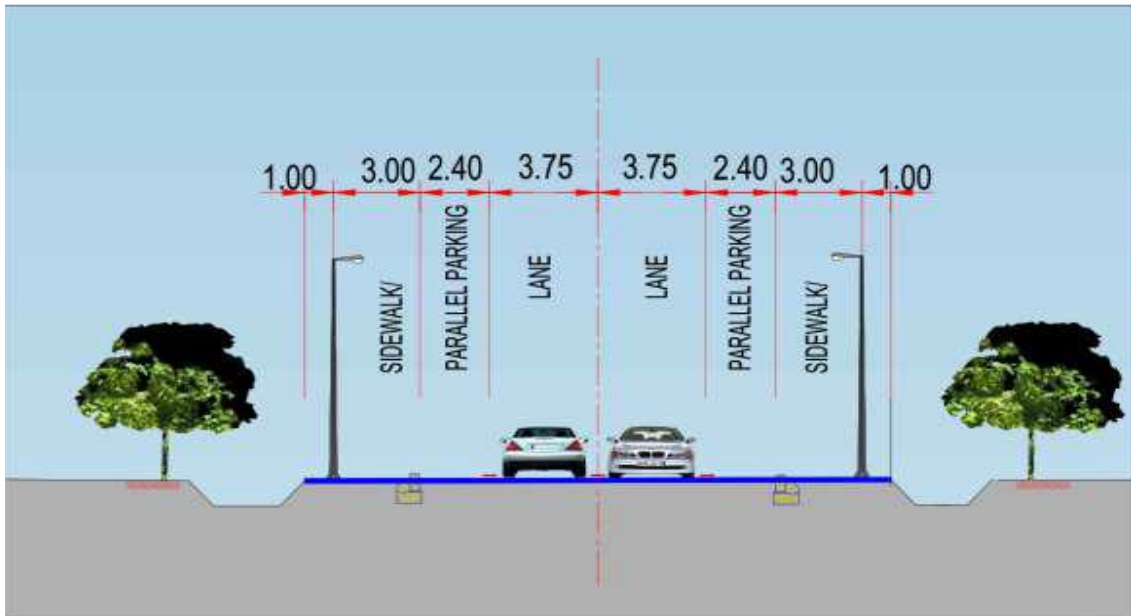


Figure 9: Igoma-Buhongwa Road - Road cross section with parallel parking

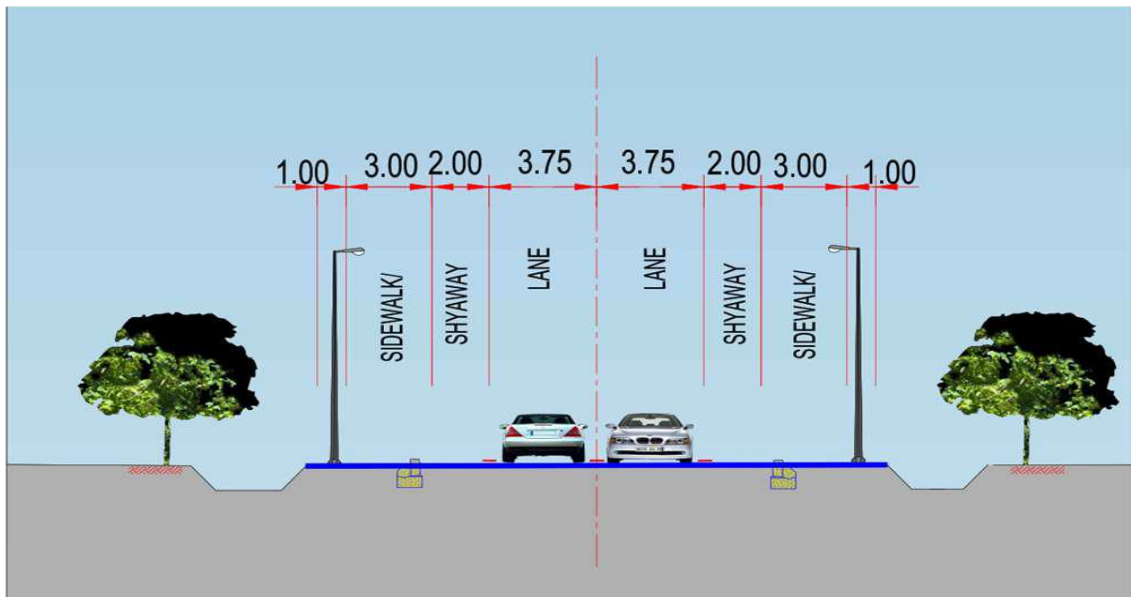


Figure 10: Igoma-Buhongwa Road - Road cross section without parallel parking

### 2.5.2 Mirongo River

The principal options considered in the shape cross-sections of Mirongo River channels are basically as follows:

- Trapezoidal open channel
- Rectangular open channel

The choice of the type of section depends on many factors, like the available corridor width, value of land and existing land use. Trapezoidal sections are recommended in wide open spaces, while rectangular ones are recommended in high dense urbanized areas. The trapezoidal section is preferred for its economic value, river banks slope stability and its larger conveyance capacity when compared to rectangular sections. The side slopes of

channels depend on the soil conditions and practicality of construction within economical limits. Stabilization of side slopes is required in cases where poor quality soil is encountered. The choice of the type of side-slope protection depends on many factors, like the estimated design flow at each design section, and natural slope of the terrain that affects the flow velocity in the channel or conduit. For earth channels to be river trained, a trapezoidal section is proposed with side slopes 3 horizontal to 1 vertical (**Figure 11**). For the lined trapezoidal channels, side slopes of 2 horizontal to 1 vertical are proposed.

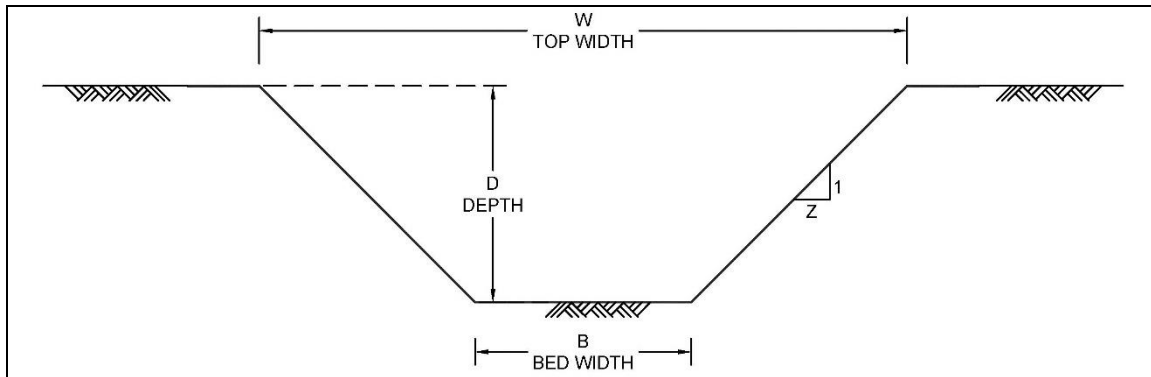


Figure 11: Typical Cross-Section for an Earth Channel.

Lined channels are usually proposed in urbanized areas where it is difficult to allocate wide right of ways. In this case, channel sizes can be reduced by lining the channels. Lining has many advantages over earth channels such as:

- Protect drainage channels against substantial damages caused by scour
- Increases the conveyance of channels and accordingly decreases their size and right of way.
- Guarantees non-encroachment of urbanization on channels and the right of way of drainage systems.

Lining is necessary to protect drainage channels against the substantial damages due to scour (**Figures 12 and 13**).

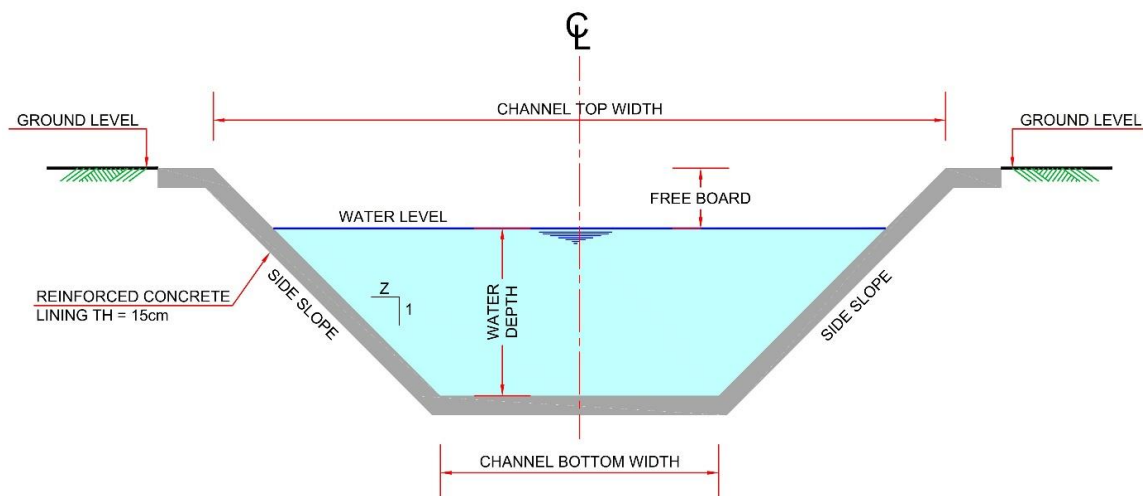


Figure 12: Typical Cross-Section for a Concrete Lined Channel (Bed and Sides)

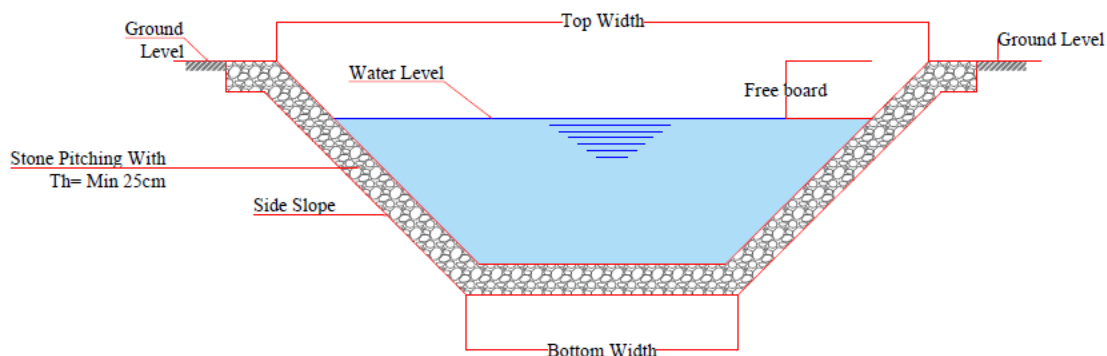


Figure 13: Typical Cross-Section for a Grouted stonepitching Lined Channel (Bed and Sides)

Concrete open channels should be provided with weep holes in locations where they are below ground water table. These weep walls are small openings designed to bleed off excess moisture collected behind the walls of drainage channels. They allow relief of hydrostatic pressure water exerted by the groundwater on the walls by allowing trapped groundwater to escape. These weep holes should have a minimum diameter to permit free drainage, with an adequate spacing between weep holes to allow uniform drainage from behind the wall. Weep holes should always have a filter material between the wall and the backfill to prevent migration of fine material and loss of backfill. Maintenance of these weep holes are highly necessary to overcome clogging caused by weeds and vegetation.

## 2.6 Project Activities

### 2.6.1 Mobilization or pre-construction phase

#### *Activities*

This phase entails mobilization of labour force, equipment and construction of offices/camps as well as acquisition of various permits as required by the law. Other activities during this phase include project appraisal, Topographical Survey, Geo-technical Investigation, Soils and Construction Materials Investigation, Land acquisition (If any), material storage and material preparation, Identification sources of material (borrow pits & quarry sites) including and source of water. The proposed project is expected to employ about 200 workers mobilization and pre-construction phase.

#### *Duration*

The duration of this phase will be month (3) months.

#### *Types and Sources of Project requirements*

Types and sources of project requirements during the pre-construction phase are shown in **Table 5**.

Table 5: Types and sources of project requirements during the pre-construction phase

<b>Requirements</b>	<b>Type</b>	<b>Source</b>	<b>Quantity (Approx)</b>
Raw Materials	Gravel	Designated quarry	7,500 - 10,000 tons
	Hard Stone	Designated quarry	25 – 30 tons
	Sand	Designated borrow pits	56 tons
	Cement	Mwanza	3 tons
	Water	Lake Victoria and MWAUWASA	70,000 litres
	Reinforcement bars	Mwanza	9 tons
	Timber	Mwanza	1 ton
Energy	Electricity	TANESCO (National Grid)/Generators	220 kV
	Fuel	Local vending stations	
Manpower	Skilled	Contractor	100
	Unskilled	Local people along the road	100
Equipment	Dump Truck	Contractor	2
	Graders	Contractor	1
	Dozer	Contractor	1
	Water Boozers	Contractor	5
	Vibrators	Contractor	1
	Excavator	Contractor	2

(Source: consultant's analysis, 2022)

### ***Transportation***

Materials (fine and coarse aggregates) from quarries will be transported by trucks to the construction sites. Water will be moved by water boozers. Other materials like cement, timber and reinforcement bars will be transported by Lorries to the construction site.

### ***Storage***

Some of the materials from borrow pits will be used directly after delivery and as such no piling up is expected. Other materials like aggregates and sand will be stored at the backyard of the camp site/office ready for use. Cement and reinforcement bars will be stored in special storage rooms. Timber will directly be used at the required areas and consequently there will be no stockpiling of timber at the camp sites/offices. Fuel/oils will be stored in drums at bunded areas.

### ***Types, Amounts and treatment/disposal of Wastes***

Types, amounts and treatment/disposal of wastes during the pre-construction phase are shown in **Table 6**.

Table 6: Types, amounts and treatment/disposal of wastes during the pre-construction phase

<b>Waste</b>	<b>Types</b>	<b>Amount</b>	<b>Treatment/ Disposal</b>
Solid Waste (Degradable)	Garbage: Food remains, cardboards and papers	40kg/day (based on generation rate of 0.1kg/day/ person and 200 workers)	Collected in a large skip bucket at the campsite/site office then to be composted and used as manure for the gardens at the camp site/site office
Solid Waste (Non-Degradable)	Scrap metals and plastics	3kg per day	Sold to Recyclers
	Tins and glasses	3kg per day	Taken to the Authorised dumpsite
Liquid waste	Sewage	6.4 m <sup>3</sup> (Based on 200 people, 40l/capita/day water consumption and 80% becomes wastewater)	Septic tank – Soakaway system at the campsites/ office
	Oils and greases	None	Car maintenance will be done at proper garages

### 2.6.2 Construction phase

#### ***Activities***

The major construction activities include;

- Extraction and transportation of materials (gravel, sand, hard stones, aggregates, water and bitumen)
- Clearing the Corridor of Impact (CoI).



- Formation of the road embankment, establishment of sub-base and base, road surfacing
- Construction of drainage structures
- Construction of Bus Bays for major roads
- Installation of road furniture
- Pedestrian Crossings, Speed Humps and Rumble Strips shall be provided in all built up areas, near schools and trading centres
- The landscaping of areas covered by the project roads and establishment of vegetation for functional and aesthetic purposes on cut and fill slopes
- The final finishing and cleaning up of the roads after construction, treating of old roads and temporary diversion

### ***Duration***

The duration of this phase will be eighteen (18) month.

### ***Types and Sources of Project requirements***

Types, amounts and sources of project requirements during the construction phase are shown in **Table 7**.

Table 7: Types and sources of project requirements during the construction phase

<b>Requirements</b>	<b>Type</b>	<b>Source</b>	<b>Quantity (Approx)</b>
Raw Materials	Gravel	Designated quarry	50,000 – 55,000 tons
	Hard Stone	Designated quarry	130 tons
	Sand	Designated borrow pit	250 – 280 tons
	Water	MWAUWASA	500,000 litres
	Bitumen	Contractors Apshalt plant	3,000 tons
	Cement	Mwanza	10,000 tons
	Reinforcement bars	Mwanza	80 tons
	Timber		1 ton
Manpower	Skilled	Contractor	25
	Unskilled	Local People	75
Equipment	Dozer	Contractor	2
	Grader	Contractor	3
	Pay Loader	Contractor	3
	Excavator	Contractor	4
	Vibro Roller	Contractor	4
	Tandem Roller	Contractor	1
	Macadam Roller	Contractor	1
	Tire Roller	Contractor	2
	Dump Truck	Contractor	8
	Mixer Truck	Contractor	2
	Water Truck	Contractor	3
	Tractor w/Trailer	Contractor	4
	Tire crane	Contractor	2
	Cargo Crane Truck	Contractor	1
	Cargo Truck	Contractor	2
	Crusher Plant	Contractor	1
	Screen Unit	Contractor	1
	Concrete Batch Plant	Contractor	1

Requirements	Type	Source	Quantity (Approx)
	Asphalt Plant	Contractor	1
	Asphalt Finisher	Contractor	1
	Asphalt Distributor	Contractor	1
	Air Compressor	Contractor	3
	Generator	Contractor	4
	Fuel Truck	Contractor	1
	Light Vehicle	Contractor	10

(Source: consultant's analysis, 2022)

### ***Manpower (Skilled and Unskilled Labour)***

**Table 7** is in tandem with the Environmental and Social Standard (ESS) 2 on Labour and working conditions. The Environmental and Social Standards applicable for this project, a number of project workers will be employed for the implementation of the project including construction of different investment subprojects which will employ about 100 workers. Project workers will be provided with information and documentation that is clear and understandable regarding their terms and conditions of employment. The information and documentation will set out their rights under national labor and employment law (which will include any applicable collective agreements), including their rights related to hours of work, wages, overtime, compensation and benefits, as well as those arising from the requirements of this ESS. This information and documentation will be provided at the beginning of the working relationship and when any material changes to the terms or conditions of employment occur.

In order, to ensure fair treatment of workers, the Project will ensure that terms and conditions of employment (hours, rest periods, annual leave, non-discrimination and equal opportunity in recruitment and employment), respect for workers organizations, inclusion of redundancy plans, the prohibition of forced labor and of worst forms of child labor, occupational health and safety, including use of Personal Protective Equipment (PPE), and operation of a worker grievance mechanism for workers to address employment-related concerns, including sexual harassment, are aligned with the requirements of national law and ESS2. To protect workers, the project will ensure the application and implementation of all appropriate Occupational Health and Safety (OHS) measures, to avoid and manage the risks of ill health, including in relation to COVID-19, accidents and injuries. Labour Management Procedures (LMP) have been prepared to ensure these requirements of ESS2 and national law are observed and included in the specifications for contractors. The project will manage any labor influx and work camps for project workers in accordance with the provisions ESS2 and ESS4. As the situation permits and depending on the public health circumstances, the project will ensure compliance with national law, policies and protocol requirements as well as World Health Organization and World Bank guidance<sup>1</sup> regarding the COVID-19 situation in relation to stakeholder consultations, project worksites and related areas. Table 12 shows the estimated types and the amount of labour forces which will be needed during construction phase.

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<sup>1</sup> World Bank Technical Note: Public Consultations and Stakeholder Engagement in WB-supported operations when there are constraints on conducting public meetings. March 20, 2020; and "ESF/Safeguards Interim Note: COVID-19 Considerations in Construction/Civil Works Projects", April 7, 2020.

### ***Transportation***

Materials (fine and course aggregates) from quarries will be transported by trucks to the construction site. Water will be moved by water boozers. Other materials like cement, timber and reinforcement bars will be transported by Lorries to the construction site.

### ***Storage***

Some of the materials from borrow pits will be used directly after delivery and as such no piling up is expected. Other materials like aggregates and sand will be stored at the backyard of the camp site/office ready for use. Cement and reinforcement bars will be stored in special storage rooms. Timber will directly be used at the required areas and consequently there will be no stockpiling of timber at the camp sites/offices. Fuel/oils will be stored in drums at banded areas.

### ***Types, Amounts and treatment/disposal of Wastes***

Types, amounts and treatment/disposal of wastes during the construction phase are shown in **Table 8**.

Table 8: Types, amounts and treatment/disposal of wastes during the construction phase

<b>Waste</b>	<b>Types</b>	<b>Amount</b>	<b>Treatment/ Disposal</b>
Solid Waste (Degradable)	Vegetations (Trees, Grasses) and remnants of timber.	300m <sup>3</sup> of biomass	Source of energy for cooking for residents near the project roads
	Food remains, cardboards and papers	10kg/day (based on generation rate of 0.1kg/day/ person for 100 people)	Collected in a large skip bucket at the campsite then to be composted and used as manure for the gardens at the camp site/office
Solid Waste (Non-Degradable)	Topsoils	6m <sup>3</sup> (Based on removal of 10cm topsoil from the (5x12)m <sup>2</sup> area on both sides of the roads	Backfilling material in the borrow pits, fill the diversions.
	Scrap metals, drums and plastics	8 kg per day	Sold to Recyclers
	Tins and glasses	8 kg per day	Taken to the Authorised dumpsite at
	Brick and stone pieces	10 kg day	Backfilling material in the borrow pits, fill the diversions.
Liquid waste	Sewage	3.2m <sup>3</sup> /day (Based on 100 people, 40l/capita/day water consumption and 80% becomes wastewater)	Septic tank –Soak away system at the camp site/office and mobile toilets along the route.
	Oils and greases	None	Car maintenance will be done at proper garages

(Source: consultant's analysis, 2022)

### 2.6.3 Demobilization phase

#### **Activities**

- Demobilization of temporary structures will be done for proper restoration of the site (e.g. removing/spreading top-soils piled along the road, removing all temporary structures, campsites/offices may be left to the local governments depending on agreements that will be reached during the mobilization phase.
- Other activities include rehabilitation of the workshop and stockpile yard, rehabilitation of campsite at least to the original condition, clearance of all sorts of wastes including used oil, sewage, sewage, solid wastes (plastics, wood, metal, papers, etc).
- Deposit all wastes to the authorised dumpsite.
- Restoration of water ponds to a natural and useable condition
- Termination of temporary employment.

#### **Duration**

Demobilization stage will last for a period of three (3) months.

#### **Types and Sources of Project requirements**

Types, amounts and sources of project requirements during the demobilization phase are shown in **Table 9**.

Table 9: Types and sources of project requirements during the demobilization phase

<b>Requirements</b>	<b>Type</b>	<b>Source</b>	<b>Quantity</b>
Manpower	Skilled	Contractor	10
	Unskilled	Local People along the road	25
Equipments	Bull dozer	Contractor	1
	Motor grader	Contractor	1
	Roller Compactor	Contractor	1
	Plate compactor	Contractor	3
	Tippers	Contractor	1

(Source: Consultant's analysis, 2022)

#### **Types treatment/disposal of Wastes**

The demobilization of the temporary structures will result mainly into solid wastes such as timber, iron sheets and rubbles from demolitions. Timber and iron sheets will be sold to people in the nearby communities for reuse while the rubbles will be sent to the authorised dumpsite for disposal.

### 2.6.4 Operation phase

#### **Activities**

The actual usage of the road is expected to commence after the construction works. The project roads are under “road” category and therefore will be directly managed by - Mwanza City Council. The design period is 20 years, after which re-surfacing will be needed. During this time, will carry out routine maintenance by attending to pot holes, clearance of vegetation within the CoI (Corridor of Impact) and monitoring.

Other activities includes Installation of road signs, thermo-plastic road marking, reinforcement and replacement of road furniture, control of litter accumulation on road sides, awareness rising on proper road use and road management to the communities, monitoring

and evaluation, management to reduce pollutant concentrations in runoff, disposal of wastes from road maintenance activities, storage and management of maintenance materials and equipment.

### ***Duration***

The duration of this phase will be twenty years (20) years.

### ***Types and Sources of Project requirements***

Types and sources of project requirements during the operational phase are shown in **Table 10**.

Table 10: Types and sources of project requirements during the operational phase (Maintenance)

<b>Requirements</b>	<b>Type</b>	<b>Source</b>	<b>Quantity</b>
Raw Materials	Gravel	Designated quarry	5,000 tons
	Hard Stone	Designated quarry	15 tons
	Sand	Designated quarry	300 tons
	Water	MWAUWASA	100,000 litres
	Asphalt	Contractors Asphalt Plant	4,500 tons
	Cement	Mwanza region	5 tones
Manpower	Skilled	Contractor	10
	Unskilled	Local People along the road	20
Equipments	Excavator	Contractor	1
	Wheel loader	Contractor	1
	Water Boozer	Contractor	1
	Bull dozer	Contractor	1
	Motor grader	Contractor	1
	Roller	Contractor	1
	Compactor		
	Plate compactor	Contractor	1
	Crasher	Contractor	1
Tippers	Contractor	1	

(Source: *Consultant's analysis*)

### ***Transportation***

Materials (fine and course aggregates) from quarries will be transported by trucks to the construction site. Water will be moved by water boozers. Other materials like asphalts, cement, timber and reinforcement bars will be transported by Lorries to the maintenance site.

### ***Storage***

Most of Materials like Aggregates, Sand, and Water will be used directly after delivery and as such no piling up is expected. Cement and reinforcement bars will be stored in special storage rooms at the store. The asphalt will be stored in their respective containers which will be kept in the storage rooms.

### ***Types, Amounts and treatment/disposal of Wastes***

Types, amounts and treatment/disposal of wastes during the construction phase are shown in **Table 11**.

Table 11: Types, amounts and treatment/disposal of wastes during the operational phase

Waste	Types	Amount	Treatment/ Disposal
Solid Waste (Degradable)	Vegetations (Trees and Grasses)	5m <sup>3</sup> / month	Source of energy for cooking for residents near the project roads
Solid Waste (Non-Degradable)	Scrap metals, drums and plastics	10 kg per Month	Sold to Recyclers
	Asphalt concrete, Tins, glasses	10 kg per Month	Taken to the dumpsite
Liquid waste	Oils and greases	None	Car maintenance will be done at proper garages

(Source: consultant's analysis, 2022)

### 2.6.5 Construction materials

The main construction materials for the road include sand, gravel, hard stones (aggregates), reinforcement iron bars, water and bitumen. Most of the materials shall be obtained locally (within Tanzania) except bitumen which shall be imported. Material investigations have been made with the aim of identifying sources for suitable construction materials including borrow pits, sand pits, construction water sources and quarry sites. All materials taken be sourced from existing sources by using certified suppliers (Probably new quarry site or borrow pit shall be opened for this project).

#### ***Borrow Areas***

The construction materials like sand and aggregates to be used for the proposed building will be sourced within authorized borrow pits found in Mwanza Region.

#### ***Water Sources***

Water will be supplied by Mwanza Urban Water and Sewerage Authority (MWAUWASA).

#### ***Sources of industrial materials for road construction***

Traditional road construction materials that will be used in this project, generally have been tested by Approved Laboratories for compliance and many of them can be sourced from within the Mwanza region.

#### ***Cement, Iron Bars, Timber***

Supplied by local vendors in Mwanza region. The Cement is easily available in the mainland, packed in 50kg bags and sourced from Mwanza region. The nearest industries include Twiga Cement, Dangote cement etc.

#### ***Reinforcement Steel***

Reinforcing steel for structural works is also be supplied by local vendors in Mwanza region. Their strength and other properties of reinforcing steel will to be confirmed by testing of samples in approved testing laboratories before use.

#### ***Bitumen***

Bitumen for road works will be obtained by the contractor from a registered vendor. Bitumen properties will be checked by testing representative samples in approved laboratories.

***Lime***

Industrial hydrated Lime can be obtained from nearest industry and other sources. The material is available in Tanzania. However, before the material is purchased for use in this projects, its properties will be checked by testing representative samples in approved laboratories.

## CHAPTER THREE

### POLICY, ADMINISTRATIVE AND LEGAL FRAMEWORK

#### 3.1 National Policies

Environmental awareness in the country has significantly increased in recent years. The government has been developing and reviewing national policies to address environmental management in various sectors. Among others, the objective of these policies is to regulate the development undertaken within respective sectors so that they not undertaken at the expense of the environment. The national policies that address environmental management as far as this project is concerned and which form the corner stone of the present study include the following:

##### 3.1.1 National Environmental Policy (NEP) of 2021

Tanzania currently aims to achieve sustainable development through the rational and sustainable use of natural resources and to incorporate measures that safeguard the environment in any development activities. The environmental policy document seeks to provide the framework for making the fundamental changes that are needed to bring consideration of the environment into the mainstream of the decision-making processes in the country.

The National Environmental Policy, 2021 serves as a national framework for planning and sustainable management of the environment in a coordinated, holistic and adaptive approach taking into consideration the prevailing and emerging environmental challenges as well as national and international development issues. It is worth noting that, effective implementation of this policy requires mainstreaming of environmental issues at all levels, strengthening institutional governance and public participation in environmental management regime. The long-term vision of this policy is geared towards realization of environmental integrity, assurance of food security, poverty alleviation and increased contribution of the environmental resources to the national economy.

The National Environmental Policy of 2021 replaces the NEP of 1997 whose objective was to provide for the implementation of a range of strategic interventions to address the identified priority areas of environmental concerns by involving Government sectors and other stakeholders. This approach was preferred on the understanding that all stakeholders would take priority actions to address the environmental challenges based on the fact that environment is a cross-cutting issue and as such environmental challenges affect all sectors. In order to implement the Policy, the Government enacted the Environmental Management Act (2004) to provide for legal and institutional framework for sustainable management of the environment. In addition to this, the Government in collaboration with other stakeholders implemented several strategies, programs, plans and projects through which the policy objectives were implemented.

The specific objectives of the National Environmental Policy of 2021 are: i) To strengthen coordination of environmental management in sectors at all levels; ii) To enhance environmentally sound management of land resource for socio-economic development; iii) To promote environmental management of water sources; iv) To strengthen conservation of wildlife habitats and biodiversity; v) To enhance conservation of forest ecosystems for sustainable provision of environmental goods and services; vi) To manage pollution for safe and healthy environment; vii) To strengthen the national capacity for addressing climate change impacts; viii) To enhance conservation of aquatic system for sustained natural



ecosystem; ix) To ensure safety at all levels of application of modern biotechnology; x) To promote gender consideration in environmental management; xi) To promote good governance in environmental management at all levels; and xii) To ensure predictable, accessible, adequate and sustainable financial resources for environmental management.

### 3.1.2 National Transport Policy (2003)

The vision of this policy is “to have an efficient and cost-effective domestic and international transport service to all segments of the population and sectors of the national economy with maximum safety and minimum environmental degradation”. Its mission is to “Develop safe, reliable, effective, efficient and fully integrated transport infrastructure and operations which will best meet the needs of travel and transport at improving levels of service at lower costs in a manner which supports government strategies for socio-economic development whilst being economically and environmentally sustainable”. In transport, the main objective of the policy is to improve infrastructure whilst minimizing wasteful exploitation of natural resources and enhancing environmental protection. Improving infrastructure assists in poverty reduction and eradication, which is a major goal in Tanzania. Most activities in the project area depend in one way or another on the environment and therefore protection of the environment is vital.

In order to promote environmental protection whilst reducing poverty in rural areas, the policy direction is to: Influence use of alternative energy sources such as biogas and solar available at the residential localities instead of travelling long distances in search of firewood as a source of power; and raise environmental awareness.

Sections 5.9 of Road Transport and Environment it gives policy directions towards enhancing environmental protection through environmentally friendly and sustainable transport infrastructure both in the rural and urban areas. This project is the Implementation of this policy since the Project roads shall provide a reliable means of transporting people for good social welfare.

### 3.1.3 National Gender Policy (2000)

The key objective of this policy is to provide guidelines that will ensure that gender sensitive plans and strategies developed in all sectors and institutions. While the policy aims at establishing strategies to eradicate poverty, it puts emphasis on gender quality and equal opportunity of both men and women to participate in development undertakings and to value the role-played by each member of society. The Mwanza City Council have adopted the policy through the provision of equal opportunities to both men and women in road works and related activities. This project will also ensure that women, who are the main users of the infrastructure, will be adequately involved at all levels of project planning to implementation.

### 3.1.4 National Policy on HIV/AIDS (2001)

The National Policy on HIV/AIDS (2001) formulated by the Government of Tanzania (GOT) under technical support from the World Health Organization Global Programme on AIDS (WHO-GPA) that led to the establishment of National HIV/AIDS Control Programme (NACP) under the Ministry of Health. However, due to its multi-sectoral nature, there was a need to involve all sectors and community participation was found to be crucial. One of the government strategic initiatives is to establish Tanzania Commission for AIDS (TACAIDS) under the Prime Minister’s Office. The Commission provides leadership and coordination of

national multi-sectoral response to the HIV/AIDS epidemic. The management functions, institutional and organizational arrangement of TACAIDS outlined in the National Policy.

The policy identifies HIV/AIDS as a global disaster, hence requiring concerted and unprecedented initiative at national and global levels. It recognizes HIV/AIDS as an impediment to development in all sectors, in terms of social and economic development with serious and direct implication on social services and welfare. Thus, the policy recognizes the linkage between poverty and HIV/AIDS, as the poor section of the society are the most vulnerable. The main policy objective reflected well in the establishment of TACAIDS. However, the policy has also set a number of strategic objectives to deal with specific HIV/AIDS problems: Prevention of transmission of HIV/AIDS; HIV Testing; Care for People Living with HIV/AIDS (PLHAS); Enhance Sectoral roles through participation and financial support; Promote and participate in research on HIV/AIDS-including dissemination of scientific information and development of HIV vaccine; Creating a legal framework through enactment of laws on HIV/AIDS-governing ethical issues and legal status of HIV/AIDS affected families.

Other objectives include: monitoring and safeguarding rights of infected or affected people; prevent human rights abuse, discrimination and social injustice; provide effective treatment for opportunistic diseases; promote fight against drug substance abuse; prohibit misleading advertisements of drugs and other products for HIV/AIDS prevention, treatment and care.

This project can be a precursor of Incidents of HIV/AIDS due to the influx of people into the areas including construction workers. This would result in an increase in the incidence of diseases including STI, and HIV/AIDS.

#### 3.1.5 The National Water Policy (2002)

The National Water Policy recognizes that there is a growing scarcity, misuse and wastage of water resources in many places of Tanzania, which may become a serious threat to sustainable availability of the resource. The National Water Policy advocates that industrial performance depends, among other factors, on reliable water supply. However, the growth in the industrial sector has significant impact on water supply, and also in terms of potential pollution and degradation of water resources due to industrial solid wastes and effluents if not properly disposed of, but are allowed into water bodies without adequate treatment.

The National water policy requires all water users to avoid contaminating water sources. The policy also supports the application of the “polluter pays principle” and has a specific objective to “have in place water management system which protects the environment, ecological system and biodiversity”.

The proponent shall abide with the policy by using its waste management systems that ensures efficiency of the facility in management of its surrounding environment.

#### 3.1.6 The National Investment Promotion Policy (1996)

The policy encourages investment of all possible commercial and alternative sources of energy with emphasis of utilization of domestic resources with aim of ensuring security and continuity of supplies as well as reducing dependence on biomass fuels. It also promotes adoption of system of production, procurement, transportation, distribution and end-use, which are efficient and not detrimental to the environment.

The National Investment Promotion Policy encourages protection of environment in line with the countries socio-economic policies. Under the policy, investors are required to undertake activities in a manner that best contributes to consumer and environmental protection. The investors are also encouraged to use local raw materials/components where possible.

This study is undertaken to ensure that the project operation abide by the relevant provisions of the policy to ensure compliance with the development.

### 3.1.7 The National Employment Policy (2008)

To reiterate the afore-stated assertion, the development of our economy has been far from satisfactory. Such development has led to the reduction of employment opportunities and a growing state of not only poverty but also misery especially in rural areas. Based on the National Development Vision 2025, the goal of the National Employment Policy is to achieve full and productive employment for all Tanzanians. The aim of this National Employment Policy is therefore to stimulate an adequate employment growth in our economy, in order to reduce Unemployment and Underemployment rates and eventually attain full, productive, and decent employment for all Tanzanians.

The major aim of this policy is to promote employment, mainly for Tanzania citizens. Relevant sections of this policy are (i) 10, which lays down strategies for promoting employment and section 10.1 is particularly focusing on industry and trade sectors (ii) 10.6 which deals with employment of special groups i.e., women, youth, persons with disabilities and (iii) 10.8 which deals with the tendencies of private industries to employ expatriates even where there are equally competent nationals.

The proponent shall abide by this policy by ensuring gender balance throughout the project implementation and give priorities to local people.

### 3.1.8 The National Sustainable Industries Development Policy (SIDP), 1996-2020

The overall mission of industrial development in Tanzania over the coming two decades will be: to contribute towards the achievement of the overall national long-term development goals as enshrined in the overall national vision; and to enhance sustainable development of the industrial sector.

However, the national goals towards which the industrial sector will be geared include: Human development and creation of employment opportunities; Economic transformation for achieving sustainable economic growth; External balance of payments; Environmental sustainability; and Equitable development.

In order to achieve the above goals, the industrial sector needs to undergo a continuous structural orientation and enhancement of sustainable technologies progress.

Therefore, going hand in hand with the objectives of the policy, the proposed project will help stir up the industrial development for economic growth of the country due to improved and increased infrastructure.

### 3.1.9 National Human Settlements Development Policy (NHSDP), 2000

Among the objectives of this policy that touch the project is to improve the level of the provision of infrastructure and social services for the development of sustainable human

settlements and to make serviced land available for shelter to all sections of the community. Such infrastructure and services constitute the backbone of urban/rural economic activities. Another objective is environmental protection within human settlements and protection of natural ecosystems against pollution, degradation and destruction. The NHSDP recognizes planning and management of human settlement areas as one of the broad human settlement issues for environmental management. Within this regard, the NHSDP identifies environmental protection as one of the strategic issues in human settlement planning and development. NHSDP also addresses the following issues: Lack of solid and liquid waste management, leading to environmental deterioration; Emission of noxious gases from vehicles and industrial activities as a major cause of air pollution in urban areas; Encroachment into fragile and hazardous lands (river valleys, steep slopes and marshlands) leading to land degradation, pollution of water sources, etc.; increasing dependence on firewood and charcoal as a main source of energy in human settlements leading to depletion of forest, environmental deterioration and air pollution; and Un-authorized sand mining in river valleys leading to environmental degradation.

The proposed roads and Mirongo River rehabilitation are reliable project which will result to efficient transport systems that are essential to increase productivity and the establishment of small manufacturing industries. The project activities shall be carried out in such a way that pollution of any kind is avoided and the environment is protected. More-so, for all settlements which will be affected by the proposed project, the proponent will ensure they are rightfully compensated.

#### 3.1.10 The Construction Industry Policy, 2003

This policy promotes among other things, application of cost effective and innovative technologies and practices to support socio-economic development including utilities and ensure application of practices, technologies and products which are not harmful to both the environment and human health. This EIA is undertaken to ensure that the project proponent uses technologies, materials and products not harmful to both the environmental and human health by providing appropriate mitigation measures. The construction team shall abide by this policy by using modern technology during construction but with emphasis on value for money for a cost-effective project.

#### 3.1.11 Small and Medium Enterprises Development Policy, 2003

The Small and Medium Enterprises Development Policy (SMEDP) (URT, 2003) harmonizes the role of informal sector that constitute the bulk of the SMEs in Tanzania. The main objective of the SMEDP is to foster job creation and income generation through promoting the creation of new SMEs and improving the performance and competitiveness of existing ones to increase their participation and contribution to the Tanzania economy” (URT, 2003: 16). The Policy defines SME as entities mainly based on non-farm economic activities in manufacturing, mining, commerce and services, employing between 5 - 99 people with capital investment of Tshs. 5 million to 800 million (*ibid*: 4). The proposed projects in Mwanza City are likely to stimulate growth and spread of SMEs, that may be engaged in a variety of activities, including service provision and employment opportunities.

#### 3.1.12 The National Trade Policy, 2003

In accordance with the National Development Vision 2025, the goal of trade policy is that of raising efficiency and linkages in domestic production and building a diversified competitive export sector as the means of stimulating higher rates of growth and development. Five

specific objectives emanate from and reflect this goal. The first specific objective is to stimulate a process of trade development as the means of triggering higher performance and capacity to withstand intensifying competition within the domestic market. This includes the establishment of improved physical market-place infrastructure and stimulating dissemination of market information and increasing access to the market. The second objective involves economic transformation towards an integrated, diversified and competitive entity capable of participating effectively in the MTS. The third objective entails the stimulation and encouragement of value-adding activities on primary exports as a means of increasing national earnings and income flows even on the basis of existing output levels. Fourth is the stimulation of investment flows into export-oriented areas in which Tanzania has comparative advantages as a strategy for inducing the introduction of technology and innovation into production systems as the basis for economic competitiveness. The fifth objective is the attainment and maintenance of long-term current account balance and balance of payments through effective utilization of complementarities in regional and international trading arrangements as a means of increasing exports combined with initiatives for higher efficiency in the utilization of imports. The ultimate target is to enhance income generation and the people's earning power at the grass-roots level as the key to poverty reduction in fulfilment of the fundamental human right of equal opportunity for all citizens as enshrined in the constitution of the United Republic of Tanzania. The proposed road construction and river rehabilitation projects are likely to facilitate trading activities as they are important infrastructure that help in transportation of goods by increasing accessibility and fast movement between producers and consumers.

#### 3.1.13 The National Economic Empowerment Policy, 2004

The National Economic Empowerment Policy of 2004 provides general guidelines which will ensure that the majority of the citizens of Tanzania have access to opportunities to participate effectively in economic activities in all sectors of the economy. In this regard, sector policies will give preferential treatment to nationals where necessary so as to enhance their bargaining position and opportunities. Among others, the Policy focuses on: - Improving efficiency in public service delivery; Raising skills and knowledge levels; Strengthening economic infrastructure and involving Tanzanians in infrastructure development; Encouraging and strengthening the development of cooperatives; Using land as a springboard to accelerate empowerment; and establishing a sound institutional framework for managing and supervising the implementation of the National Economic Empowerment Policy. Aligning with this policy, the proponent shall ensure that the local people in the proposed project area are given priority and equal opportunity when it comes to employment along with making sure the proposed project bring a positive impact by stimulating the city's economic development.

#### 3.1.14 The Tanzania 2025 Development Vision

The Tanzania Vision 2025 aims at achieving a high-quality livelihood for its people attain good governance through the rule of law and develop a strong and competitive economy. Specific targets include:

1. A high-quality livelihood characterized by sustainable and shared growth (equity), and freedom from abject poverty in a democratic environment. Specifically, the Vision aims at: food self-sufficiency and security, universal primary education and extension of tertiary education, gender equality, universal access to primary health care, 75% reduction in infant and maternal mortality rates, universal access to safe water, increased life expectancy, absence of abject poverty, a well-educated and learning society.

2. Good governance and the rule of law moral and cultural uprightness, adherence to the rule of law, elimination of corruption.
3. A strong and competitive economy capable of producing sustainable growth and shared benefits a diversified and semi-industrialized economy, macro-economic stability, a growth rate of 8% per annum, adequate level of physical infrastructure, an active and competitive player in regional and global markets.

This proposed project is one of the most important agents to enable Tanzania achieve its Development Vision objectives (both social and economic), such as improving transport of passengers and quality of goods and services.

## **3.2 Legislation**

### **3.2.1 The Environmental Management Act of 2004 and its amendments 2016 – 2021**

The Environmental Management Act (EMA) is a piece of legislation that forms an umbrella law on environmental management in Tanzania. Its enactment has repealed the National Environment Management Council Act. 19 of (1983) while providing for the continued existence of the National Environment Management Council (NEMC).

Among the major purposes of the EMA are to provide the legal and institutional framework for sustainable management of the environment in Tanzania; to outline principles for management, impact and risk assessment, the prevention and control of pollution, waste management, environmental quality standards, public participation, compliance and enforcement; to provide the basis for implementation of international instruments on the environment; to provide for implementation of the National Environmental Policy; to provide for establishment of the National Environmental Fund and to provide for other related matters. Part VI of the EMA deals with Environmental Impact Assessments (ESIA) and other Assessments and directs that an ESIA is mandatory for all development projects. Section 81(2) states that “*An Environmental Impact Assessment study shall be carried out prior to the commencement or financing of a project or undertaking*”, while Section 81(3) states “*a permit or license for the carrying out of any project or undertaking in accordance with any written law shall not entitle the proponent or developer to undertake or to cause to be undertaken a project or activity without an environmental impact assessment certificate issued under this Act*”. This EISA is conducted for this project in order to abide to this law.

### **3.2.2 The Road Act, 2007**

For purposes of this project, the Road Act 2007 serves as a guide to the use of the road reserve. Contrary to previous informal understanding, the reserve is exclusive to road related activities that do not include other utilities. However, clause 29 (2) does give provision for the request and terms of approval for use of the road reserve by utilities such as power lines and water pipes. On land acquisition the Act clearly states in part III, Section 16 that ‘*where it becomes necessary for the road authority to acquire a land owned by any person, the owner of such land shall be entitled to compensation for any development on such land in accordance with the Land Act and any other written law*’. Mwanza City Council shall observe this law for the conservation of the Road Reserve and Compensation of the PAPs.

### **3.2.3 Occupation Safety and Health Act, 2003**

The law requires employers to provide a good working environment to workers in order to safeguard their health. The employers need to perform medical examinations to determine fitness before engaging employees. Employers must also ensure that the equipment used by

employees is safe and shall also provide proper working gear as appropriate. PO-RALG and Contractor shall observe this law during construction.

#### 3.2.4 Employment and Labour Relations Act No. 6 R.E 2019

The Act makes provisions for core labour rights; establishes basic employment standards, provides a framework for collective bargaining; and provides for the prevention and settlement of disputes. PO-RALG shall see to it that the Contractor adheres to employment standards as provided for by the law.

#### 3.2.5 Engineers Registration Act and its Amendments 1997 and 2007

The Acts regulate the engineering practice in Tanzania by registering engineers and monitoring their conduct. It establishes the Engineering Registration Board (ERB). Laws require any foreigner engineer to register with ERB before practicing in the country. Foreign engineers working with this project shall abide to the law requirement.

#### 3.2.6 Contractors Registration Act, 1997

The Contractors Registration Act requires contractors to be registered by the Contractors Board (CRB) before engaging in practise. It requires foreign contractors to be registered by the Board before gaining contracts in Tanzania. PMO-RALG shall comply with the law requirement during the recruitment of contractors for project implementation.

#### 3.2.7 HIV and AIDS (Prevention and Control) Act, 2008

The law provides for public education and programmes on HIV and AIDS. Section 8(1) of the law states that “The Ministry (Health), health practitioners, workers in the public and private sectors and NGOs shall for the purpose of providing HIV and AIDS education to the public, disseminate information regarding HIV and AIDS to the public”. Furthermore, Section 9 states that “Every employer in consultation with the Ministry (Health) shall establish and coordinate a workplace programme on HIV and AIDS for employees under his control and such programmes shall include provision of gender responsive HIV and AIDS education”. This project shall abide to HIV/AIDS Act in the fight against the disease.

#### 3.2.8 Workers Compensation Act, 2008

An Act to provide for compensation to employees for disablement or death caused by or resulting from injuries or diseases sustained or contracted in the course of employment; to establish the Fund for administration and regulation of workers compensation and to provide for related matter. The Act applies to all employers and employees, including those in the public service, as well as those employed on a Tanzania ship or aircraft. The Act applies to mainland Tanzania.

#### 3.2.9 Environmental Impact Assessment and Auditing Regulations, 2005

These regulations set procedures for conducting ESIA and environmental audit in the country. The regulations also require registration of ESIA experts. This ESIA has been conducted following the above stated regulations.

### 3.2.10 Environmental Code of Practice for Road Works, 2009

The purpose of this Environmental Code of Practice is therefore to guide the intervention of road engineers and technicians during the planning, design, construction and operation phases, so that direct adverse (negative) impacts of the project can be avoided or minimised through appropriate corrective measures. Ultimately, the intention is to ensure that all environmental considerations are well integrated into the road projects and activities.

The main objective of this Environmental Code of Practice for Road Works is to provide a tool, which integrates identified environmental aspects for project managers, road engineers, technicians, contractors, and environmental specialists. The Code aims to exclude from environmental impact assessments (ESIAs) the technical aspects discussed in this Code because these aspects can be directly applied by the road engineers in the conception/planning phase. The ESIA will then be able to focus on the direct and indirect effects of the project, as well as on the specific mitigation measures of each project.

It is expected that the road engineers and technicians using the Code will come from both the public and private sectors. The public entities could include the Ministry of Infrastructure Development (MOID), Tanzania National Roads Agency (TANROADS), Local Government Authorities (District Councils) under the President's Office Regional Administration, and Local Government (PO-RALG). "Users" from the private sector will include private sector engineering consulting firms and contractors. Environmental consultants taking part in road-sector Environmental Assessment will also use this Code as a reference.

### 3.2.11 Environmental Assessment and Management Guidelines for the Road Sector (2011)

The Environmental Assessment and Management Guidelines for the Road Sector (EAMGRS) were developed in December 2004 (Signed in 2011), just after EMA (2004) was enacted. The guidelines give procedures for the ESIA process as briefly explained in **Table 3.1**.

**Table 3.1:** Developed ESIA Procedures in the Road Sector

<p><b>ESIA PROCEDURES IN THE ROAD SECTOR (as per EAMGRS 2011)</b></p> <p><b>Administrative Procedures:</b></p> <p>ESIA administrative procedures vary based on the significance of the environmental impacts. The Minister for Environment is responsible for projects with potential major environmental impacts. The ESIA of projects with potential non-major environmental impacts are carried out under the Ministry responsible for the road sector and the Road Sector-Environmental Section (RS-ES).</p> <p><b>Environment Application and Screening Process:</b></p> <p>EA procedures in the road sector are initiated when the Road Implementing Agency (RIA) submits an Environment Application Form to the RS-ES during the Project Identification or Project Planning/Feasibility Study Phase. An environmental screening of the proposed project will determine whether the project will require: An Initial Environmental Examination (IEE); a Limited Environmental Analysis (LEA); or a detailed Environmental Impact Assessment (ESIA).</p> <p>Environmental Screening is done based on the information presented in the Environmental Application Form. The RS-ES is responsible for screening projects and this may acquire a reconnaissance study by an environmental specialist, especially if</p>
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the project transverses sensitive areas or when there is potential for complex environmental issues.

All road projects with non-major environmental impacts shall be subject to an Initial Environmental Examination (IEE) or a Limited Environmental Analysis (LEA). Projects with major environmental impacts are subject to ESIA. The RS-ES will register non-major-impact-projects. For major-impact-projects, the registration is done by NEMC.

### 3.2.12 Standard Specifications for Road Works (2000)

These specifications were officially released in 2002. The main aim is to provide the specifications which should be adhered by contractor construction of roads. This document is usually part and parcel of the contract documents. Section 1700 of these specifications is dedicated to Environmental Protection and Waste disposal. This section contains the following Sub-sections;

- 1703 Landscape Preservation
- 1704 Temporary Soil Erosion Control
- 1705 Preservation of Trees and Shrubbery
- 1706 Prevention of Water Pollution
- 1707 Abatement of Air Pollution
- 1708 Dust Abatement
- 1709 Noise Abatement
- 1710 Light Abatement
- 1710 Preservation of Historical and Archaeological Data
- 1711 Pesticides, Toxic Waste and Hazardous Substances
- 1712 Clean up and Disposal of waste materials
- 1713 Measurements and Payments

This Section of standard specification shall be part and parcel of the ESMP for this project.

### 3.2.13 The Land Transport Regulatory Authority Act, 2019

This is an Act to make provisions for the establishment of Land Transport Regulatory Authority, to regulate land transport sector, to repeal the Surface and Marine Transport Authority and for related matters.

The Act establishes functions of the Authority which are:

(a) to perform the functions conferred on the Authority; by sector legislation; (b) to issue, renew and cancel permits or licences; (c) subject to sector legislation to-(i) establish standards for regulated goods and regulated services; (ii) establish standards for the terms and conditions of supply of the regulated goods and services; and (iii) regulate rates and charges; (d) to coordinate land transport safety activities; (e) to register crew and certify drivers of regulated sector; (f) to certify worthiness of rolling stock and road worthiness of public service vehicles and goods vehicles; (g) to monitor the performance of the regulated sectors including- (i) levels of investment; (ii) availability of safe, quality and standards of services; (iii) cost of services; (iv) efficiency of production and distribution of services; and (v) other matters relevant to the Authority; (h) to facilitate resolution of complaints and disputes; (i) to disseminate information about matters relevant to the functions of the Authority; (j) to consult with other regulatory authorities or bodies or institutions discharging functions similar to those of the Authority in Mainland Tanzania or elsewhere; and (k) to perform such other functions as may be conferred on the Authority by this Act or any other law. (2) In the

performance of its functions, the Authority shall not award or cancel a licence having a term of five or more years without prior consultation with the Minister and the relevant sector Minister. (3) The Minister may, for the purposes of securing the effective performance by the Authority of its functions, give to the Authority directions of a specific or general character.

#### 3.2.14 The Environmental Management (Registration and Practice of Environmental Experts) Regulations, 2021

The Regulations applies to registration, categorization, practicing and conduct of environmental experts and firms of environmental experts registered and certified under these Regulations to conduct- (a) environmental impact assessment; (b) environmental audit; or (c) any other environmental study that may be required to be undertaken under the Act or its Regulations. The objectives of these Regulations are to- (a) establish a system of registration, categorization and practicing of environmental experts; (b) provide for qualifications for persons who may conduct environmental studies; (c) provide for a system of nurturing competence, knowledge and consistence of environmental experts in the carrying out of environmental impact assessment and environmental audits; and (d) provide for a code of conduct, discipline and control of environmental experts.

#### 3.2.15 The Urban Planning Act, 2007

The Act provides for control of urban and sub rural development while implementing a project for land development. Important aspects include the designation and allocation of adequate land for solid waste disposal in any urban and sub rural areas. The law empowers local authorities to enforce such schemes and punishments as stipulated in the Act. The law further empowers neighbors and any individual to take to court anyone who injuriously affects others due to his/her unhygienic activities.

Urban Planning Act, 2007 stipulates that in planned areas, the construction of any building should start when the building permit has been issued by responsible land office. This permit will be issued after the site plan has been approved by City, Municipal or Town planner The Architectural plans with sanitation drawings need to be approved by an Engineer, an Architect and Health officer. Through this process, the issues of accessibility in case of emergency, emergency exits, proper ventilation and health and hygiene issues are usually taken seriously before the approval.

Therefore, the proposed project is approved by the authority that is the Mwanza City Council and therefore it is in line with the objectives of this law. The project proponent will observe good solid and liquid waste disposal practice as required by the Act.

#### 3.2.16 Public Health Act, 2009

The Public Health Act is the most recently enactment. The Act provides for legal and institutional framework for promotion, preservation, and maintenance of public health. The Act replicates some of the provisions of the Environmental Management Act. It regulates human and housing settlements. It provides for legal and institutional framework for the management of solid and liquid wastes by prescribing conditions for keeping and maintaining dumping sites, collection and disposal of liquid wastes, designation of transfer stations etc. The Act also stipulates conditions for management and control of gaseous wastes from dwelling houses, industries and motor vehicles management of excreta, hazardous and health care wastes and their disposal.

The Act provides conditions for construction, maintenance and use of sewerage systems, latrines septic tanks etc. The Act creates offenses relating to violations of public health rules and stipulates penalties.

These provisions have direct implication to proposed project. The proponent will have the responsibility of ensuring that it complies with the requirements of the Act in all phases of the project i.e., construction, operation and decommissioning thus protecting public health.

### 3.2.17 The Water Supply and Sanitation Act, 2019

This Act to provide for sustainable management and adequate operation and transparent regulation of water supply and sanitation services; to provide for the establishment of water supply and sanitation authorities, Rural Water Agency, National Water Fund and Community based water supply organizations; to provide for appointment of service providers, repeal of the Water Supply Act, 2009 and Dar es Salaam Water and Sewerage Authority Act, 2001 and to provide for related matters. Water supply authorities are duty bound to enter into a trade waste agreement for the discharge of waste into a sewerage system, to prohibit the discharge of certain wastes into sewerage a system. The Act creates the offence of willfully or negligently damaging water works, any sewer, sewerage treatment plant or other assets of water supply authorities. Any person who unlawfully diverts or takes water from the water works also commits an offence.

The proponent will abide to the given provisions by making sure all sewage produced and any other waste is well contained in the designed facilities and once full are properly disposed through contractors to the designated areas. Also, the proponent shall ensure all water used in the project is accounted for and the water sources and supply infrastructures are protected. All this is to ensure the environment becomes sustainable to all living beings at neighborhood of the proposed project.

### 3.2.18 The Architects and Quantity Surveyors Act, 1997

An Act to establish the Board to regulate the conduct of Architects, Quantity Surveyors, Architectural and Quantity Surveying firms, to provide for their registration and for related matters. This Act was enacted by the parliament to provide for establishment of a board to regulate the conduct of Architects and Quantity surveyors and architectural and quantity surveying consulting firms in Tanzania.

The board is vested with powers to inspect premised or construction sites to verify whether the rules and regulations of carrying out construction projects are adhered by consulting firms. This is aimed at ensuring that appropriate professionals who are registered by the board are involved in undertaking works as required by the law.

This Act has direct implications to the proposed project and thus the proponent has hired registered Architects and Quantity Surveyors when preparing the drawings of the proposed project. Therefore, the proponent abides by this Act.

### 3.2.19 Engineers Registration Act No 15 of 1997

This Act establishes an Engineering Registration Board (ERB) which regulates the conduct of engineers, to provide for their registration and for related matters. The Act provides restriction that no person other than a registered engineer shall engage in professional engineering work or services which includes professional service consultation, planning, designing or responsible supervision of construction or operation in connection with any

public or privately owned public utilities, buildings, machines, equipment, processes, works or projects where public interest and welfare, or the safeguarding of life, public health or property is concerned or involved, and that requires application of engineering principles and data. Furthermore, the Act stipulates that no person shall employ or continue to employ - any engineer who is not a registered as a professional engineer.

The developer abides to the Act by assigning the registered engineers to carry out the engineering activities and guidance to the completion of the project. The proponent shall engage qualified engineers so as to observe the provisions of the Act when executing its activities.

### 3.2.20 Fire and Rescue Services Act, 2007

According to the Act, among others, the functions of the force are to: '(a) Extinguish fire (b) grade cities, Districts, townships and Mtaa into various fire and rescues services levels (c) conduct fire inspection and investigations for purposes of obtaining information relating to the causes of fire and loss inflicted by fire (d) Conduct studies on investigation of arson and accidental fire (e) Conduct training for fire department personnel, other officers and voluntary fire fighters (f) Prepare fire statistics and fire service information (g) Conduct fire tests on protection facilities, equipment and materials. In section 3(1) (g) it covers premises of facility used as a place for storage flammable liquids, gas or chemicals.

The Act obliges the owners and managers of the structures to set aside places with free means of escape, and install fire alarm and detection systems, or such other escape and rescue modalities in the event of fire. The proposed project is prone to fire risks, to comply with the Act, measures such as installation of fire extinguishers and emergency preparedness and response plan will be instituted for fire risks abatement.

### 3.2.21 Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018

Based on Regulation No. 6(1) of the Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations G.N. No. 474 of 2018, the project falls under Type B2 of the third schedule of the regulations on which EIA shall be undertaken and can be done. This report has been prepared with reference to Regulation No. 6(1) of the Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations G.N. No. 474 of 2018, as a one step toward integrating Environmental concerns into development processes for sustainable development.

In this regard, proponent shall abide by the relevant provisions given in the Regulation. Being aware of the above, Proponent commissioned Dar Alhandasah in JV with Don Consult who subcontracted Ms. Rosemary Nyirenda to carry out the Environmental Impact Assessment and submit an Environmental Impact statement report to the Council for review as Environmental Management Act, 2004 requires.

### 3.2.22 The Environmental Management (Hazardous Waste Control and Management) Regulations, 2019

These regulations shall apply to all categories of hazardous waste and to the generation, collection, storage, transportation, treatment, recycling, re use, recovery and disposal of hazardous waste and their movements into and out of Tanzania Mainland.

The proponent will adhere to the existing regulations by making sure proper ways are used to manage/ handle produced hazardous waste all its phases thus ensure the environment is protected from such harmful pollution.

### 3.2.23 Environmental Management (Air Quality Standards) Regulations, 2007

The objectives of these Regulations shall be to:

- a) Set baseline parameters on air quality and emissions based on a number of practical considerations and acceptable limits;
- b) Enforce minimum air quality standards prescribed by the National Environmental Standards Committee;
- c) Help developers such as industrialists to keep abreast with environmentally friendly technologies; and
- d) Ensure protection of human health and the environment from various sources of pollution.

The proponent shall abide by the relevant provisions given in these regulations to ensure the quality of air is maintained to the required standard and avoid pollution that may cause harm to the environment hence affect public health.

### 3.2.24 Environmental Management (Soil Quality Management) Regulations, 2007

The object of these Regulations is to:

- a) Set limits for soil contaminants in agriculture and habitat;
- b) Enforce minimum soil quality standards prescribed by the National Environmental Standards Committee;
- c) Prescribe measures designed to maintain, restore and enhance the sustainable productivity of the soil;
- d) Prescribe minimum soil quality standards to maintain, restore and enhance the inherent productivity of the soil in the long term;
- e) Enforce minimum soil standards prescribed by the National Environmental Standards Committee for such purposes as agricultural practices;
- f) Ensure implementation of criteria and procedures prescribed by the National Environmental Standards Committee for the measurement and determination of soil quality;
- g) Prescribe measures and guidelines for soil management; and
- h) Ensure compliance with any such measures and guidelines for soil management that may be prescribed by the minister.

The proposed project may result to soil pollution in one way or another due to several activities. In this regard, proponent shall be required to properly handle all the oil spills during the operations or any other activities that will result to soil pollution.

### 3.2.25 Environmental Management (Control of Ozone Depleting Substances) Regulations, 2007

These Regulations shall apply to:

- a) All persons dealing or otherwise handling or using controlled substances or products that contain, is made with or is dependent on, or designed to contain chemical substances that have the potential to destroy ozone molecules in the stratosphere and includes the products listed in the First Schedule to these Regulations;
- b) Every importer and distributor of ozone depleting substances;
- c) Every importer of technology which uses ozone depleting substances;
- d) Every company and individual who services refrigerators, air conditioners including mobile and other ozone depleting substances technologies;
- e) Every company or an individual using or servicing fire extinguishers.

The project proponent will abide to the given regulation to make sure ozone is protected from any ozone depleting substance.

### 3.2.26 Environmental Management (Water Quality Standards) Regulations of 2007

Part I of this regulation Section (3) provides the objectives the following objectives;

- a) Protect human health and conservation of the environment;
- b) Enforce minimum water quality standards prescribed by the National Environmental Standards Committee;
- c) Enable the National Environmental Standards Committee to determine water usages for purposes of establishing environmental quality standards and values for each usage; and
- d) Ensure all discharges of pollutants take account the ability of the receiving waters to accommodate contaminants without detriment to the uses specified for the waters concerned.

However, Part III of this regulation gives the prohibitions and prescribed minimum water quality standards.

The proponent shall protect water sources from any kind of pollution by having well organized and designed structures to ensure all the operations are compliant to this regulation provided.

### 3.2.27 Environmental Management (Solid Wastes Management) Regulations, 2009

The Environmental (Solid Waste Management) Regulations of 2009, provides principles for management and control of solid wastes including administration and institutional arrangement, licenses and permits. Regulation 5 (1) states that, any person who owns or controls a facility or premises which generates waste shall minimize the waste generated by adopting cleaner production principles such as improvement of production process through conserving raw materials and energy by:

- a) Eliminating the use of toxic raw materials within such times as may be prescribed by the Minister; and
- b) Reducing toxic emissions and wastes to a level prescribed in the applicable national environmental quality standards. Regulation 17 (a) prohibits certain solid wastes into receptacles. The regulation states that no person shall deposit hazardous substance including asbestos or asbestos containing material, explosives, fireworks, firearms, batteries, hot ashes, flammable liquid, highly flammable materials, infectious material, pressurized containers (other than a pressurized container commonly used for containing domestic products such as fly spray, hair spray and similar materials), or radio-active material. Regulation 17 (b) prohibits any person to deposit certain solid wastes of corrosive, carcinogenic, flammable, persistent, toxic, explosive, or radioactive nature materials into receptacles. Regulation 17 (c) prohibits any person to deposit any liquid, acid, paint, printers' ink, oil, oil sludge, asphalt emulsion, viscous fluid or similar product into receptacles which if spilt in a public place may cause damage or injury or result in pollution of the environment. PART VI of the regulations is on plastic waste management. Under the duty to segregate solid waste, regulation 35-(1) requires any person to ensure that plastic materials are separated from non-plastic materials and deposited into receptacles prescribed by local government. Regulation 35-(2) states that duties to segregate waste apply to all stages of waste management including collection, transportation and final disposal.

The proponent will comply with the given provisions by proper handling of all the wastes at their premises through provision of adequate waste collection facilities before final disposal by contractor to the appropriate dumpsite.

### 3.2.28 Environment Management (Quality Standards for Control of Noise and Vibration Pollution) Regulations, 2015

The object of the regulations as prescribed by the National Environmental Standards Committee which are stated in section 4 shall be to- (a) ensure the maintenance of a healthy environment for all the people in Mainland Tanzania, the tranquility of their surrounding and their psychological well-being by regulating noise and vibration levels; (b) prescribe the maximum permissible noise and vibration levels from a facility or activity to which a person may be exposed; (c) provide for the control of noise and vibration and mitigating measures for the reduction of noise and vibration; (d) set baseline parameters on noise and vibration permissible levels based on a number of practical considerations and acceptable limits; (e) enforce minimum noise and vibration limits prescribed by the National Environmental Standards Committee; (f) help developers such as industrialists to keep abreast with environmentally friendly technologies; and (g) ensure protection of human health and the environment from various sources of noise and vibration pollution.

Part III section 7 (1) are General Prohibitions 7 which states that no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and that of the environment.

Section 8 stipulates on excessive vibrations. "Except as otherwise provided in these Regulations, no person shall- (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 meters from any moving source".

Section 9 (1) provides permissible noise levels in terms of maximum noise levels while section 10 (1) and (2) states the tolerance limits for environmental vibrations.

The proposed construction activities are expected to generate some noise and vibrations which the Developer through Contractor have to abide with these Regulations. Under the regulation the Contractor will be required to undertake daily monitoring of the noise levels within the Project area during construction period to maintain compliance. Due to nature of the activities of the building, no excessive noise and vibrations are expected during the operation phase.

### 3.2.29 The Land Use Planning Act, 2007

The Act provides for the procedures for the preparation, administration, and enforcement of land use plans; to repeal the National Land Use Planning Commissioning Act, and to provide for related matters. Among the objectives of the Act as given in Section 4 are to facilitate the orderly management of land use and to promote sustainable land-use practices. This proposed project aligns with the provisions of this act, any infringement on existing land use shall need a consultation with land use planning authorities.

### 3.2.30 The Companies Act, 2002 Cap 212 R.E 2019

The amendment of the Companies Act (Cap. 212) provides that any company that intends to promote commerce, investment, trade or any other activity as the Minister may, by notice published in the Gazette, prescribe, shall be incorporated or registered under this Act. Therefore, all companies that will be involved in this proposed project must adhere to this Act to ensure the projects smooth undertaking.

### **3.3 International Treaties and Agreements**

Tanzania has ratified a number of Multilateral Environmental Agreements (MEAs) and consequently is bound by obligations under these agreements. The most relevant MEAs to this particular project are the African Convention on the Conservation of Nature and Natural Resources. Like the CBD, this Convention alerts nations on the conservation the African nature and natural resources in their widest sense. Infrastructure upgrading project is likely to interfere with the normal lives of nature such population and some habitats.

#### 3.3.1 United Nations Framework Convention on Climate Change (1992)

The objective of United National Framework Convention on Climatic Change (UNFCCC) is to stabilize the concentration of greenhouse gas (GHG) in the atmosphere, at a level that allows ecosystems to adapt naturally and protects food production and economic development. Article 4 commits parties to develop, periodically update, publish and make available national inventories of anthropogenic emissions of all greenhouse gases not controlled by the Montreal Protocol (by source) and inventories of their removal by sinks, using agreed methodologies. It commits parties to mitigate GHG as far as practicable. Since Tanzania is a Party to the Convention, she will have to account for all sources of GHG in her future National Communications. In this aspect, since this proposed Project is subjected to emission some amount of the GHG from its facilities-vehicles and machineries.

#### 3.3.2 Kyoto Protocol (1997)

The Kyoto Protocol is an international agreement linked to the UNFCCC. The Kyoto Protocol binds 37 industrialised countries and the European Community to reduce their GHG emission by 5% from 1990 levels in the commitment period 2008-2012. The Protocol differs from the Convention in that while the Convention encourages industrialized countries to stabilize GHG emissions, the Protocol commits them to do so. It recognizes that developed countries are principally responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity. As a result, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities." It provides mechanisms to achieve this objective, namely the carbon trading, joint implementation and the clean development mechanism (CDM). Since Tanzania is not one of the 37 industrialised countries bound by the Protocol, on the CDM it is relevant to this project.

#### 3.3.3 The convention on wetland RAMSAR

The Convention on Wetlands (Ramsar, Iran, 1971) - called the "Ramsar Convention" -- is an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the "wise use", or sustainable use, of all of the wetlands in their territories. Unlike the other global environmental conventions, Ramsar is not affiliated with the United Nations system of



Multilateral Environmental Agreements, but it works very closely with the other MEAs and is a full partner among the "biodiversity-related cluster" of treaties and agreements.

### 3.3.4 Convention on Protection of Workers against Occupational Hazards in the Working Environment Due to Air Pollution, Noise and Vibration.

This Convention, ratified by Tanzania in 1984, provides the framework for ensuring a safe working environment for workers. The implementation of infrastructural sub-projects will ensure that it prevents the exposure of its workers and the public from any occupational hazards by providing appropriate security and safety equipment.

## **3.4 Regional Agreements**

### 3.4.1 Other relevant International Conventions Ratified by Tanzania

ILO Convention: C138 Minimum Age Convention, 1973 (Ratified by Tanzania (United Republic of) on 16:12:1998) which prohibits Child labour. ILO Convention: C182 Worst Forms of Child Labour Convention, 1999 (Ratified by Tanzania (United Republic of) on 12:09:2001). Therefore, in accordance with these Convention requirements, TACTIC Projects shall adhere to the ILO Convention, particularly in child labour employment. ILO Convention: C148 Working Environment (Air Pollution, Noise and Vibration) Convention, 1977 (Ratified by Tanzania (United Republic of) on 30:05:1983) which protects Workers against Occupational Hazards in the Working Environment Due to Air Pollution, Noise and Vibration.

## **3.5 World Bank Environmental and Social Framework (ESF)**

### 3.5.1 World Bank Environmental and Social Standards (ESS)

The World Bank's Environmental and Social Framework sets out the Bank's commitment to sustainable development, through a Bank Policy and a set of Environmental and Social standards that are designed to support Borrowers' projects, with the aim of ending extreme poverty and promoting shared prosperity. The E&S Framework comprises of: (1) Vision for Sustainable Development, which sets out the Bank's aspirations regarding environmental and social sustainability; (2) The World Bank Environmental and Social Policy for Investment Project Financing, which sets out the mandatory requirements that apply to the Bank; and (3) The Environmental and Social Standards, together with their Annexes, which set out the mandatory requirements that apply to the Borrower and projects.

The World Bank Environmental and Social Policy for Investment Project Financing sets out the requirements that the Bank must follow regarding projects it supports through Investment Project Financing. The Environmental and Social Standards set out the requirements for Borrowers relating to the identification and assessment of environmental and social risks and impacts and mitigation measures associated with projects supported by the Bank through Investment Project Financing. The E&S standards are expected to: (a) support Borrowers in achieving good international practice relating to environmental and social sustainability, (b) assist Borrowers in fulfilling their national and international environmental and social obligations; (c) enhance non-discrimination, transparency, participation, accountability and governance; and (d) enhance the sustainable development outcomes of projects through ongoing stakeholder engagement. The ten ESSs as per the WB ESF are: ESS 1: Assessment and Management of Environmental and Social Risks and Impacts; ESS 2: Labor and Working Conditions; ESS 3: Resource Efficiency and Pollution Prevention and Management; ESS 4: Community Health and Safety; ESS 5: Land Acquisition, Restrictions on Land Use

and Involuntary Resettlement; ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources; ESS 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities; ESS 8: Cultural Heritage; ESS 9: Financial Intermediaries; and ESS 10: Stakeholder Engagement and Information Disclosure. Given the nature of activities of this project, with the exception of ESS 9: Financial Intermediaries almost all the ESSs will be relevant.

Environmental and Social Standard ESS1 applies to all projects for which Bank Investment Project financing is sought. ESS1 establishes the importance of: (a) the Borrower's existing environmental and social framework in addressing the risks and impacts of the project; (b) an integrated environmental and social assessment to identify the risks and impacts of a project; (c) effective community engagement through disclosure of project-related information, consultation and effective feedback; and (d) management of environmental and social risks and impacts by the Borrower throughout the project life cycle. The Bank requires that all environmental and social risks and impacts of the project be addressed as part of the environmental and social assessment conducted in accordance with ESS1. ESS2–10 set out the obligations of the Borrower in identifying and addressing environmental and social risks and impacts that may require particular attention based on the proposed project activities. The World Bank Access to Information Policy, which reflects the Bank's commitment to transparency, accountability and good governance, applies to the entire Framework and includes the disclosure obligations that relate to the Bank's Investment Project Financing. Borrowers and projects are also required to apply the relevant requirements of the World Bank Group Environmental, Health and Safety Guidelines (EHSBs). These are technical reference documents, with general and industry specific examples of Good International Industry Practice (GIIP).

According to the TACTIC ESMF the proposed sub projects will apply the Environmental and Social Standards as described in **Table 12**.

Table 12: Application of World Bank’s ESSs to the TACTIC Project

ESSs	Yes/No	Application
ESS 1: Assessment and Management of Environmental and Social Risks and Impacts	Yes	The Project will exert site-specific environmental and social impacts which will be managed through this ESMF. Site-specific ESIA and ESMPs will be prepared to recommend E&S measures to be incorporated into designs of the specific subprojects.
ESS 2: Labor and Working Conditions	Yes	<p>A number of project workers will be employed for the implementation of the project including construction of different investment subprojects. Project workers will be provided with information and documentation that is clear and understandable regarding their terms and conditions of employment. The information and documentation will set out their rights under national labor and employment law (which will include any applicable collective agreements), including their rights related to hours of work, wages, overtime, compensation and benefits, as well as those arising from the requirements of this ESS. This information and documentation will be provided at the beginning of the working relationship and when any material changes to the terms or conditions of employment occur.</p> <p>In order, to ensure fair treatment of workers, the Project will ensure that terms and conditions of employment (hours, rest periods, annual leave, non-discrimination and equal opportunity in recruitment and employment), respect for workers organizations, inclusion of redundancy plans, the prohibition of forced labour and of worst forms of child labour, occupational health and safety, including use of Personal Protective Equipment (PPE), and operation of a worker grievance mechanism for workers to address employment-related concerns, including sexual harassment, are aligned with the requirements of national law and ESS2. To protect workers, the project will ensure the application and implementation of all appropriate Occupational Health and Safety (OHS) measures, to avoid and manage the risks of ill health, including in relation to COVID-19, accidents and injuries. Labour Management Procedures (LMP) have been prepared to ensure these requirements of ESS2 and national law are observed and included in the specifications for contractors. The project will manage any labor influx and work camps for project workers in accordance with the provisions ESS2 and ESS4. As the situation permits and depending on the public health circumstances, the project will ensure compliance with national law, policies and protocol requirements as well as World Health Organization and World Bank guidance<sup>2</sup> regarding the COVID-19 situation in relation to stakeholder consultations, project worksites and related areas.</p>
ESS 3: Resource Efficiency and Pollution	Yes	Implementation of most of the investment subprojects will involve construction activities that will generate dust, erosion, sediments, solid and liquid wastes that will be properly managed via ESIA, ESMPs and WMP. More or less similar

<sup>2</sup> World Bank Technical Note: Public Consultations and Stakeholder Engagement in WB-supported operations when there are constraints on conducting public meetings. March 20, 2020; and “ESF/Safeguards Interim Note: COVID-19 Considerations in Construction/Civil Works Projects”, April 7, 2020.

ESSs	Yes/No	Application
Prevention and Management		impacts are likely to be experienced during operation phases and will be managed by the same tools as well as operation and maintenance plans.
ESS 4: Community Health and Safety	Yes	<p>Construction activities (excavation, vehicle operations, work at height, use of chemicals, use of crane or other heavy equipment etc.) may have irreversible effects of disability or fatality to community. Localized negative impacts (like dust emissions, accidents, etc.) to sensitive receptors such as schools, religious buildings and community centers will need to be managed. The Project will require Contractors to prepare appropriate plans for emergency preparedness and response, management and safety of hazardous materials, traffic and road safety, security personnel, etc. as per the requirement of ESS4.</p> <p>Implementation of the Project is likely to trigger influx of workers or job seekers and their followers into some sub-project areas. If a significant labor influx does occur, the project will develop and implement a Labor Influx Management Plan in line with ESS2, ESS4 and other provisions of the ESF. The project workforce could facilitate an increase in the transmission of HIV and other communicable diseases to members of the local/host communities during implementation of the sub-projects. Specific measures to address GBV risks are presented in section 3.11 and the Project GRM in section 4 will be implemented.</p> <p>As the situation permits and depending on the public health circumstances, the project will ensure compliance with national law, policies and protocol requirements as well as World Health Organization and World Bank guidance<sup>3</sup> regarding the COVID-19 situation in relation to stakeholder consultations, project worksites, communities and related areas.</p>
ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Yes	<p>Land acquisition, restrictions on land use and involuntary resettlement are likely during the implementation of the Project. The RPF will provide guidance on RAP preparation.</p> <p>The project shall try to minimize land acquisition and any associated physical or economic resettlement wherever possible especially during detailed engineering designs for roads, drains, and other community facilities to be upgraded/constructed.</p>
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Yes	<p>No sub-projects will be financed inside or near protected areas and sensitive habitats. Sub-projects will be screened for potential direct and indirect impacts on natural habitats.</p> <p>In case the project will purchase natural resources commodities such as timber, it will be important to establish the source area and to have a mechanism in place to ensure that the Primary Suppliers are not significantly impacting sensitive ecosystem or degrading natural habitats.</p>
ESS 7: Indigenous	No	Relevance of this ESS will further be assessed during project preparation as part of the ESIA process and as we get more information and clarity especially

<sup>3</sup> World Bank Technical Note: Public Consultations and Stakeholder Engagement in WB-supported operations when there are constraints on conducting public meetings. March 20, 2020, and “ESF/Safeguards Interim Note: COVID-19 Considerations in Construction/Civil Works Projects”, April 7, 2020.

ESSs	Yes/No	Application
People/Sub-Saharan African Historically Underserved Traditional Local Communities		about selected and confirmed locations and sites for project implementation.
ESS 8: Cultural Heritage	Yes	The Project will be implemented in 45 LGAs, all with different cultural backgrounds. Elements of cultural heritage are found in some of the ULGAs such that there potential for cultural heritage resources to be found unexpectedly (chance finds) and screening of subproject sites to avoid impacts on cultural heritage during construction. Chance finds procedures will be included in the Specifications for the contracts.
ESS 9: Financial Intermediaries	No	This ESS is not relevant to the Project.
ESS 10: Stakeholder Engagement and Information Disclosure	Yes	A Stakeholder Engagement Plan (SEP) has been prepared to guide implementing agencies on how to provide stakeholders with timely, relevant, understandable and accessible information, and consult with them in a culturally appropriate manner, which is free of manipulation, interference, coercion, discrimination and intimidation as well as establishment / strengthening as relevant of a GRM for all stakeholders.

### 3.5.2 World Bank Safeguard Tools for the TACTIC Project in Mwanza City Council

The implementation of each of the ESSs will be enabled through five instruments which are all part of the Operational Manual of the TACTIC and therefore mandatory and which have been developed based on the respective ESSs:

- Environmental and Social Management Framework (ESMF) (and subsequent ESIA/ESMPs) for the application of the ESS1, ESS2, ESS3, ESS4, ESS6 and ESS8.
- Stakeholders Engagement Plan (SEP) for the application of ESS10;
- Resettlement Policy Framework (RPF) and any subsequent RAPs for the application of ESS5;
- Labour Management Procedures for the application of ESS2
- Environmental and Social Commitment Plan (ESCP) which will describe the obligations of the borrower to apply the above instruments and other actions.

### 3.5.3 World Bank EHS Guidelines

The World Bank Groups Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). EHS Guidelines are applied as required by their respective policies and standards. These industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors. Specific guidelines which will be used is Environmental, Health, and Safety (EHS) Guidelines: Environmental Waste Management. As stipulated earlier the guidelines will be used together with the Environmental, Health, and Safety General Guidelines. The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at

reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them. The applicability of the EHS Guidelines will be tailored to the hazards and risks established for the project in accordance to the proposed project activities. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of technical feasibility. The applicability of specific technical recommendations will be based on the professional opinion of qualified and experienced persons.

The project proponent shall comply with the relevant requirement of environment, health and safety (EHS) of the World Bank Group (WBG). The World Bank Environmental Health and Safety General Guidelines containing quantitative limits and good international management practices to manage potential impacts (**Table 13**).

Table 13: World Bank EHS Guidelines applicable

EHS Guideline	Content and Relevance for the upgrading of Igoma-Buhongwa road and the Mirongo river
General EHS Guidelines (2007)	These guide performance levels and measures that are generally considered in the achievement of new facilities by existing technology at reasonable costs. Application of the EHS guidelines to existing facilities may involve establishing site-specific targets, with an appropriate timetable for achieving them.
EHS Guidelines for - Air Emissions and Ambient Air Quality, 2007	Requirements of the guidelines have been incorporated in the analysis and management measures for emissions management during construction and operation phases of the proposed facilities at Mwanza City Council. This provides guiding approach to managing significant sources of emissions, including specific guidance for assessment and monitoring of impacts.
General EHS Guidelines 3 Community Health and Safety (2007)	These address project activities implemented outside of the traditional project boundaries but that are nonetheless related to the project operations, including water quality and availability, traffic safety, transport of hazardous materials, disease prevention, and emergency preparedness and response.
EHS Guidelines: Waste Management Facilities (2007)	If significant waste management activity such as incineration is included in the project scope/design basis, leading to creating a separate waste management facility, the World Bank guidelines for dedicated waste management facilities could apply.
General EHS Guidelines 1 Environmental (2007)	It covers a range of environmental aspects that apply to most industrial development projects. The subsections are air emissions and ambient air quality, energy conservation, wastewater and ambient water quality, water conservation, hazardous materials management, waste management, noise and contaminated land.
WHO Ambient Air Standards	The ambient air quality guidelines specified in the Standard have been incorporated in the analysis and development of management measures to avoid or minimize human health risks.

### 3.5.4 Other World Bank Instruments Applicable for TACTIC Project

- ***Environmental and Social Framework - Guidance Notes for Borrowers***<sup>4</sup>;

The World Bank has developed several Guidance Notes to ensure the governments (borrowers) comply with the World Bank Environmental and Social Standards. This guidance are public documents that be accessed in the World Bank website<sup>5</sup>.

Among the applicable guidance notes for this project are:

- Community Health and Safety:  
<http://documents.worldbank.org/curated/en/290471530216994899/ESF-Guidance-Note-4-Community-Health-and-Safety-English.pdf>
- Gender based violence:  
<http://documents.worldbank.org/curated/en/399881538336159607/Environment-and-Social-Framework-ESF-Good-Practice-Note-on-Gender-based-Violence-English.pdf>

## 3.6 Institutional Framework

### 3.6.1 Overall Management Responsibility

The institutional arrangement for environmental management in Tanzania is well spelt out in the EMA (2004). There are seven (7) institutions mentioned by the act, of which the Minister Responsible for the Environment is the overall in-charge for administration of all matters relating to the environment.

Part III, Section 13(1) of EMA (2004) states that the Minister responsible for environment shall be in overall in-charge of all matters relating to the environment and shall in that respect be responsible for articulation of policy guidelines necessary for the promotion, protection and sustainable management of environment in Tanzania.

The legal institutions for environmental management in the country include;

- National Environmental Advisory Committee;
- Minister responsible for Environment;
- Director of Environment;
- National Environment Management Council (NEMC);

### 3.6.2 National Environmental Advisory Committee

The National Advisory Environmental Committee is comprised of members with experience in various fields of environmental management in the public and private sector and in civil society. The committee advises the Minister on any matter related to environmental management. Other functions include:

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<sup>4</sup> <http://www.worldbank.org/en/projects-operations/environmental-and-social-framework/brief/environmental-and-social-framework-resources#guidancenotes>

<sup>5</sup> <https://www.worldbank.org/en/projects-operations/environmental-and-social-framework/brief/environmental-and-social-framework-resources#guidancenotes>

- Examine any matter that may be referred to it by the Minister or any sector Ministry relating to the protection and management of the environment;
- Review and advise the Minister on any environmental plans, environmental impact assessment of major projects and activities for which an environmental impact review is necessary;
- Review the achievement by the NEMC of objectives, goals and targets set by the Council and advise the Minister accordingly;
- Review and advise the Minister on any environmental standards, guidelines and regulations;
- Receive and deliberate on the reports from Sector Ministries regarding the protection and management of the environment;
- Perform other environmental advisory services to the Minister as may be necessary.

**Relevance:** TAC review and advice the minister regarding this ESIA if it complies with the law.

### 3.6.3 Minister Responsible for Environment

The Minister is responsible for matters relating to environment, including giving policy guidelines necessary for the promotion, protection and sustainable management of the environment in Tanzania. The Minister approves an ESIA and may also delegate the power of approval for an ESIA to the DoE, Local Government Authorities or Sector Ministries. The Minister also:

- Prescribes (in the regulations) the qualifications of persons who may conduct an ESIA;
- Reviews NEMC reports on the approval of an ESIA;
- Issues an ESIA certificate for projects subject to an ESIA;
- Suspends an ESIA certificate in case of non-compliance.

**Relevance:** Shall issue certificate for this ESIA.

### 3.6.4 Director of Environment

The Director of Environment heads the Office of the Director of Environment and is appointed by the President of the United Republic of Tanzania. The functions of the Director of Environment include:

- Coordination of various environmental management activities undertaken by other agencies;
- Promotion of the integration of environmental considerations into development policies, plans, programmes, strategies, projects;
- Undertaking strategic environmental risk assessments with a view to ensuring the proper management and rational utilization of environmental resources on a sustainable basis for the improvement of quality of human life in Tanzania;
- Advise the Government on legislative and other measures for the management of the environment or the implementation of the relevant international environmental agreements in the field of environment;
- Monitoring and assessing activities undertaken by relevant Sector Ministries and agencies;
- Preparation and issuing of reports on the state of the environment in Tanzania through relevant agencies;



- Coordination of issues relating to articulation and implementation of environmental management aspects of other sector policies and the National Environment Policy

**Relevance:** TAC review and advice the minister regarding this ESIA if it complies with the law.

### 3.6.5 National Environment Management Council (NEMC)

The NEMC's purpose and objective is to undertake enforcement, compliance, review and monitoring of ESIA's and to facilitate public participation in environmental decision-making. According to the Environmental Management Act (2004) the NEMC has the following responsibility pertaining to ESIA in Tanzania:

- Registers experts and firms authorized to conduct ESIA;
- Registers projects subject to ESIA;
- Determines the scope of the ESIA;
- Set-ups cross-sectoral TAC to advise on ESIA reviews;
- Requests additional information to complete the ESIA review;
- Assesses and comments on ESIA, in collaboration with other stakeholders,
- Convenes public hearings to obtain comments on the proposed project;
- Recommends to the Minister to approve, reject, or approve with conditions specific EIS;
- Monitors the effects of activities on the environment;
- Controls the implementation of the Environmental Management Plan (EMP);
- Makes recommendations on whether to revoke ESIA Certificates in case of non-compliance;
- Promotes public environmental awareness;
- Conducts Environmental Audits

**Relevance:** Register and oversee the whole process of this ESIA; Controls the implementation of the Environmental Management Plan (EMP) during and after construction of the road; Monitors the effects of activities on the environment during and after construction;

### 3.6.6 Sector Ministries

The existing institutional and legal framework the Sector Ministries are required to establish Sector Environmental Sections headed by the Sector Environmental Coordinator.

The Sector Ministries' Environmental Sections;

- Ensure environmental compliance by the Sector Ministry;
- Ensure all environmental matters falling under the sector ministry are implemented and report of their implementation is submitted to the DoE;
- Liaise with the DoE and the NEMC on matters involving the environment and all matters with respect to which cooperation or shared responsibility is desirable or required;
- Ensure that environmental concerns are integrated into the ministry or departmental development planning and project implementation in a way which protects the environment;

- Evaluate existing and proposed policies and legislation and recommend measures to ensure that those policies and legislation take adequate account of effect on the environment;
- Prepare and coordinate the implementation of environmental action plans at national and local levels;
- Promote public awareness of environmental issues through educational programmes and dissemination of information;
- Refer to the NEMC any matter related to the environment;
- Undertake analysis of the environmental impact of sectoral legislation, regulation, policies, plans, strategies and programmes through strategic environmental assessment (SEA);
- Ensure that sectoral standards are environmentally sound;
- Oversee the preparation of and implementation of all ESIA's required for investments in the sector;
- Ensure compliance with the various regulations, guidelines and procedures issued by the Minister responsible for the environment and;
- Work closely with the ministry responsible for local government to provide environmental advice and technical support to city level staff working in the sector.

### 3.6.7 Regional Secretariat

The Regional Secretariat, which is headed by the Regional Environmental Management Expert, is responsible for the co-ordination of all environmental management programmes in their respective regions. The Regional Environmental Expert:

- Advises local authorities on matters relating to the implementation of and enforcement of environmental laws and regulations;
- Create a link between the region and the DoE and the Director General of the NEMC.

In Mwanza City Council, all Environmental issues handled by the City Environmental Officers.

### 3.6.8 Local Government Authorities

Under the Local Government Act of 1982 (Urban and District Authorities), Local Government Authorities include the City Councils, Municipal Councils, District Councils, Town Councils, Township, Kitongoji, Ward, Mtaa and Village.

The Environmental Management Committee of each jurisdiction:

- Initiates inquiries and investigations regarding any allegation related to the environment and implementation of or violation of the provisions of the Environmental Management Act;
- Requests any person to provide information or explanation about any matter related to the environment;
- Resolves conflicts among individual persons, companies, agencies non-governmental organizations, government departments or institutions about their respective functions, duties, mandates, obligations or activities;
- Inspects and examines any premises, street, vehicle, aircraft or any other place or article which it believes, or has reasonable cause to believe, that pollutant or other articles or substances believed to be pollutant are kept or transported;
- Requires any person to remove such pollutants at their own cost without causing harm to health and;

- Initiates proceedings of civil or criminal nature against any person, company, agency, department or institution that fails or refuses to comply with any directive issued by any such Committee.

Under the Environmental Management Act (2004), the City, Municipal, District and Town Councils are headed by Environmental Inspectors who are responsible for environmental matters. The functions of the inspectors are to:

- Ensure enforcement of the Environmental Management Act in their respective areas;
- Advise the Environmental Management Committee on all environmental matters;
- Promote awareness in their areas on the protection of the environment and conservation of natural resources;
- Collect and manage information on the environment and the utilization of natural resources;
- Prepare periodic reports on the state of the local environment;
- Monitor the preparation, review and approval of ESIA's for local investors;
- Review by-laws on environmental management and on sector specific activities related to the environment;
- Report to the DoE and the Director General of the NEMC on the implementation of the Environmental Management Act and;
- Perform other functions as may be assigned by the local government authority from time to time.

Mwanza City Council have Environmental Management officers who head the section of Environment under the department. Therefore, all issues concerning environmental management during and after construction of sub-projects handled by this section.

## CHAPTER FOUR

### ENVIRONMENTAL AND SOCIAL BASELINE DATA

#### 4.1 Geographical Location

Mwanza City is located on the southern shores of Lake Victoria in Northwest Tanzania. It covers an area of 256.45 Kilometer square of which 184.90 (72 percentages) is dry land and 71.55 Kilometer (28 percentages) is covered by water. Of the 184.90 kilometers dry land area, approximately 173 kilometers is urbanized while the remaining areas consist of forested land, valleys, cultivated plains, grassy and undulating rocky hill areas.

#### 4.2 Area and Administrative Units

Administratively, Mwanza city was established in 2000 and became among the eight councils of Mwanza Region. It is comprised of one division, namely Nyamagana, 18 wards and 175 streets. However, it is important to note that, although the law identifies Mwanza as a city, still has both rural and urban locations resulted to have both urban and rural wards. The urban wards comprise with Mbugani, Butimba, Mkuyuni, Mabatini, Nyegezi, Nyamagana, Igoma, Pamba, Mkolani, Mirongo, Isamilo and Igogo. The rural wards formed by Lwanhima, Kishiri, Buhongwa, Mhandu, Mahina and Luchebele (**Table 14**). The proposed subprojects are found in the Nyamagana division. The proposed Igoma – Kishiri – Buhongwa road passes through Igoma, Kishiri, Lwanhima and Buhongwa wards while the Mirongo River passes through Mkuyuni, Mirongo, Nyamagana, Lwanhima, Mabatini, Mbugani and Butimba wards.

Table 14: Number of Administrative Units by Wards, Mwanza City Council; 2015

Ward	Land Area (Sq. km)	No. of Hamlets	Percent of Land Area
Buhongwa	45	18	17.6
Lwanhima*	0	18	n.a
Mkolani	48.54	10	19.0
Luchebele*	0	10	n.a
Butimba	20.92	8	8.2
Nyegezi*	0	8	n.a
Igogo	23	9	9.0
Mkuyuni	19.45	8	7.6
Pamba	2	10	<b>0.8</b>
Nyamagana	12.5	4	4.9
Mirongo	2.09	3	0.8
Isamilo	13.5	11	5.3
Mabatini*	0	6	n.a
Mbugani	4	6	1.6
Mahina	24	9	9.4
Mhandu*	0	11	n.a
Igoma	41	14	16.02
Kishiri*	0	12	n.a
<b>Total</b>	<b>256</b>	<b>175</b>	<b>100</b>

\* These are new wards and their areas are included in their former wards

*Source: City Director's Office, Land and Natural Resources Department, Mwanza City, 2016*

### 4.3 Agro-Ecological Zones

#### 4.3.1 Climate

Mwanza City lies at an altitude of 1,140 metres above the sea level with 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. The city also experiences the average annual rainfalls between 700 and 1000mm falling in two fairly distinct seasons, short and long rainfalls. The short rain season occurs between the months of October and December and long rain season last between February and May. The proposed road designs shall take into consideration weather changes particularly temperature and rainfall patterns, so that they do not result to any impacts to the environment and the surrounding community. This can be by putting proper drainage, use of high-quality material to construct the roads and planting trees on the road sides.

#### 4.3.2 Topography

The topography of Mwanza City is characterized by gently undulating granites and granodiorite physiography with isolated hill masses and rock inselbergs. It is also characterized by well-drained sandy loamy soil generated from coarse grained cretaceous. The vegetation cover is typical savannah with scattered tall trees and tall grass.

#### 4.3.3 Agro-Economic Zone

The status of the city causes agriculture-Economic Zone to be not extensive to date. There is only 21 square hectares suitable for irrigation. Currently, an urbanization process transformed the extensive irrigation system to simple irrigation along the lake shores and some inland areas. Irrigation is mostly used in vegetable, fruits and maize production. The main areas where agriculture is practiced include; Kishiri, Lwanhima, Buhongwa and Mkolani wards respectively. However, production of vegetables and fruits is increasing due to higher market demand within the city, whereas, a number of tons of vegetables and fruits are transported from other areas such as Kagera, Geita and Sengerema. The construction of the proposed Igoma – Kishiri – Buhongwa road will make it easier for these products to be transported across the city timely and be able to reach a great number of consumers hence increase market for agro-products.

### 4.4 Population

Population is very important due to that it's a source of labour for the production of goods and services also provide market for goods and services, also the following are considered as the parameters of economic development; size, structure, distribution and quality of a population.

#### 4.4.1 Population Size and Growth

According to the 2002 and 2012 Population Censuses reports, the population of Mwanza City increased from 241,923 (119,617 males and 122,305 females) in 2002 and reached 363,452 (177,812 males and 185,578 females) in 2012 with the annual natural growth rate of 3.0 percent. At ward level, Table 1.4 shows the highest population increase was recorded in Buhongwa ward with an inter-censal increase of 121.7 percent between 2002 and 2012. It was followed by Mahina (85.5 percent), Mkolani (67.8 percent), Igoma (56.5 percent), Mkuyuni (41.6 percent) and lowest increase was recorded in Isamilo ward (35.6 percent). **Table 4.2** also shows that wards such as Mironko, Igogo and Nyamagana had negative population increase of 44.9 percent, 0.2 percent respectively in 2012. The main reason, among others, is the changing usage of dwellings from residential to commercial buildings in these wards causes the tenants to migrate to other wards in the city. One general observation

from these data is absence or lack of data to new wards with marked (\*) which were established after census period. The data for these wards are included in their former wards.

Table 15: Population Distribution by Sex and by Ward, Mwanza City Council; 2002 and 2012

Ward	2002			2012			Population Change	
	Male	Female	Total	Male	Female	Total	Number	Percent
Buhongwa	5,866	6,169	12,035	12,789	13,892	26,681	14,646	121.7
Lwanhima*							0	
Mkolani	9,472	9,714	19,187	15,716	16,483	32,199	13,012	67.8
Luchelele*							0	
Butimba	21,067	18,415	39,482	24,287	22,657	46,944	7,462	18.9
Nyegezi*							0	
Mkuyuni	6,598	6,663	13,261	9,163	9,617	18,780	5,519	41.6
Igogo	15,524	15,723	31,247	13,374	13,929	27,303	-3,944	-12.6
Pamba	11,667	11,793	23,460	11,411	12,108	23,519	59	0.3
Nyamagana	3,072	2,745	5,817	2,961	2,846	5,807	-10	-0.2
Isamilo	8,791	9,065	17,856	11,752	12,406	24,220	6,364	35.6
Mirongo	2,687	2,625	5,312	1,478	1,447	2,925	-2,387	-44.9
Mbugani	18,878	18,426	37,304	19,010	20,031	39,041	1,737	4.7
Mabatini*							0	
Mahina	13,702	18,345	32,047	28,550	30,887	59,437	27,390	85.5
Mhandu*							0	
Igoma	17,817	18,345	36,162	27,321	29,275	56,596	20,434	56.5
Kishiri*							0	
Total	119,617	122,305	241,923	177,812	185,578	363,452	121,529	50.2
Percent	49.4	50.6	100	48.9	51.1	100		

\* New wards did not exist in the 2012 census; their data are included to their former wards.

Source: NBS, Compiled Data from 2002 and 2012 Population Census Reports, Mwanza Region, 2016

## 4.5 Socioeconomic Activities

### 4.5.1 Gross Domestic Product (GDP)

Mwanza city, like other districts of Mwanza region, has never computed its GDP and Per capita GDP since it was established. Nevertheless, Mwanza city makes significant contribution to the Regional GDP. The 2011 Economic Survey Report shows that Mwanza region's share of the national GDP for the year 2016 was only 9.3 percent equivalent to TSHS. 8,452,013 million while per capita income of regional residents was estimated to be TSHS. 2,004,353, (equivalent to US\$ 911.1 at a rate of TZS 2,200 per USD). The regional GDP was TShs. 4,016,270 million in 2010 and TSHS. 6,654,600 million in 2013. The proposed project will be beneficial since it will improve transportation of goods and services hence increase market and can raise the city's GDP.

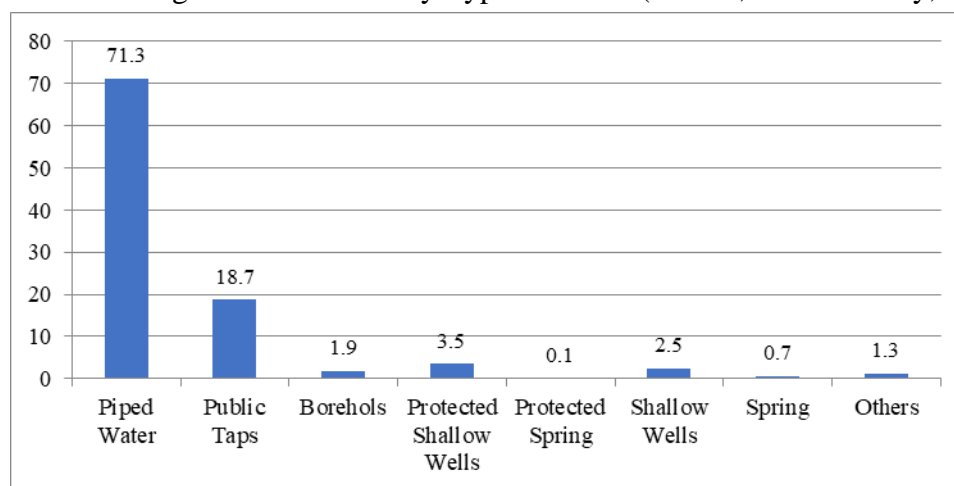
#### 4.5.2 Food Security and Food Poverty

In Mwanza City Council, although Mwanza region experienced food insecurity, it has never observed that experience. Availability of grains such as maize, sorghum, millets and paddy together with protein including livestock and fish, small fish and related species make the council as among a few councils with plenty of foods varieties in the region. Food consumption as an indicator for poverty observed on the number of meals consumed in a day and the frequencies of protein intake per week, particularly meat and fish, are most superior in measuring poverty levels of the households.

#### 4.5.3 Access to Clean Drinking Water

The topography and existence of Lake Victoria are the main reasons for the reliable sources of water in Mwanza city. The 2002 Population and Housing Census show that the piped water was the main source of drinking water in Mwanza city (71.3 percent) followed by public tapes (18.7 percent), protect shallow wells (3.5 percent) and unprotect shallow wells (2.5 percent). However, the council has very small proportions of households who use boreholes, protected spring, springs and others such as surface water and rain water harvesting (**Figure 14**).

Figure 14: Percentage of Households by Type of Water (Source, Mwanza City, 2012)



*Source: NBS, 2012 Population and Housing Census Report, Mwanza region, 2016*

#### 4.5.4 Urban Water Supply

Urban water supply in Mwanza region is still under construction of its facilities. Though district councils develop and maintain rural water supply even at their headquarters. The 2012 Population and Housing Census shows that access of safe and clean drinking water in Mwanza region is higher (85.6 percent) in urban areas than rural areas (38.6 percent).

Looking on technology used to ensure sufficient water supply in urban areas, the existing water sources in the city were mostly use (98.5 percent) hand pump machines followed by gravity piped (1.5 percent). Unfortunately, wind mill, electricity pump and diesel pump were not recorded to be used mostly in the city council. However, the council through water department should put more effort in introducing more water scheme technologies to reach the target of serving each population with clean water. The proposed project will ensure that water pipes in areas along which the river and proposed road will pass are not affected and if they are should be relocated to make water available for the community (**Table 16**)

Table 16: Number of Water Schemes by Type of Technology by Ward; Mwanza City Council; 2015

Technology	Working	Percent Working	Not Working	Percent Not Working	Total	Percent Source
Wind mill	0	0	0	0	0	0
Electricity Pump	0	0	0	0	0	0
Diesel pump	0	0	0	0	0	0
Hand Pump	30	46.9	34	53.1	64	98.5
Gravity Piped	1	100	0	0	1	1.5
<b>Total</b>	<b>31</b>	<b>47.7</b>	<b>34</b>	<b>52.3</b>	<b>65</b>	<b>100</b>

Source: Compiled data from City executive director's office, Water Department, 2016

#### 4.6 Primary Education

Education is a basic right of every Tanzanian child of school going age (7-13). To render this possible, the Government of Tanzania put in place the policy of Universal Primary Education (UPE) in 1974 making such education compulsory and setting out to make enrolment increase possible. To achieve this goal, the first task was to have enough primary schools that would ensure enrolment of all school going age children in the region.

By increasing number of primary schools from 95 in 2011 to 226 in 2015 the city council showed positive attitude by giving every child of school going age has a chance of being enrolled into standard one. **Table 17** shows that, on average, each ward had at least 4 public primary schools and a primary school in each mtaa as city council had 19 wards, 123 mitaa and 226 public primary schools in 2015. Furthermore, Table 5.19 also reveals that Nyegezi had the largest number of public primary schools (151), whilst Mahina had the least with 0 schools.

Table 17: Distribution of Primary Schools by Council; Mwanza Region, 2015

Ward	No. of Mitaa	No. of Schools	Schools Mtaa Ratio
Buhongwa	18	3	6
Lwanhima	18	2	9
Mkolani	10	3	3
Luchelele	10	3	3
Butimba	8	6	1
Nyegezi	8	2	1
Igogo	9	6	2
Mkuyuni	8	4	2
Pamba	10	8	1
Nyamagana	4	2	2
Mirongo	3	4	1
Isamilo	11	8	1



Mabatini	6	5	1
Mbugani	6	1	6
Mahina	9	3	3
Mhandu	11	10	1
Igoma	14	6	2
Kishiri	12	7	2
<b>Total</b>	<b>175</b>	<b>80</b>	<b>47</b>

Source: City Director's Office (Education Department), Mwanza City Council, 2016

Looking at ownership, out of 95 primary schools recorded in 2011, only 8.0 percent was privately owned. In 2013, private primary schools were only 37.6 percent out of 162 schools and 64.2 percent of 226 primary schools were privately owned in 2015.

The proposed project will increase accessibility of these schools hence increase cheap and fast means of transport and make it easy for pupils, teachers and other school workers.

#### 4.7 Employment Status at the Council

The performance of the City mainly based on both human and financial resources. Mwanza city according to **Table 18** shows that education sector covers 80 percent (49.2 percent primary teachers and 38.4 percent secondary teachers) out of 2,509 employees of Mwanza city in 2011, it was followed by health sector (9.4 percent) and agriculture and livestock (2 percent), while other sectors accounted for only a percent. The number of employees of key sectors has reached 3,391 in 2013 and became 3,680 in 2015. Again, education sector had the highest percentage of employees in the city. The proposed project will help provide temporary employment to the community members of the city hence be able to earn income.

Table 18: Number of Government Employees in Key sectors of Economy, Mwanza city; 2011, 2013 and 2015

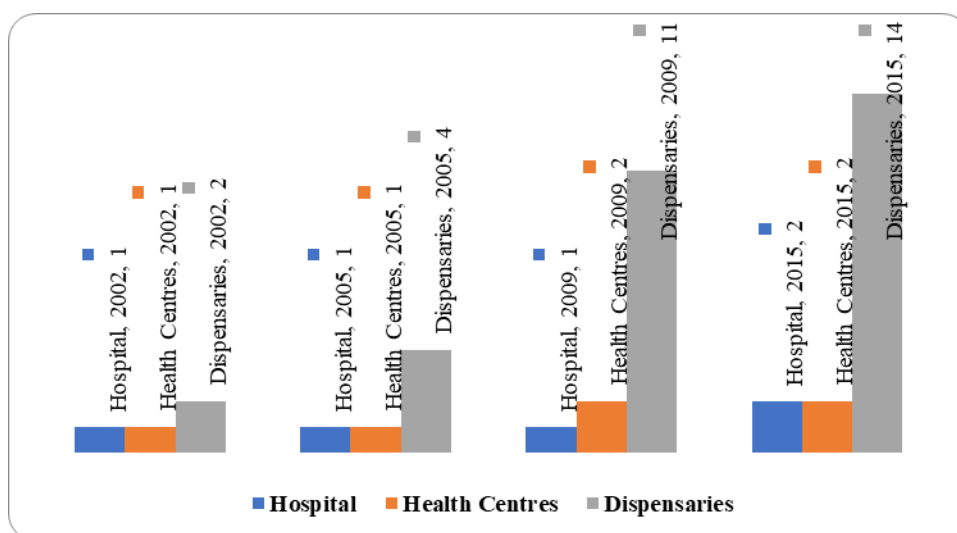
Key Sector	2011		2013		2015		Change of Staff 2011 and 2015	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Education - Primary Teachers	1,234	49.2	1,758	51.8	1,803	48.9	569	46.1
Education - Secondary Teachers	963	38.4	1,166	34.4	1,586	43.0	623	64.7
Health sector	237	9.4	393	11.6	210	5.7	-27	-11.4
Agriculture and Livestock sector	50	2.0	44	1.3	45	1.2	-5	-10.0
Natural Resource sector	14	0.6	14	0.4	18	0.5	4	28.6
Planning Stat. and Evaluation Works	6	0.2	6	0.2	7	0.2	1	16.7
	5	0.2	10	0.3	19	0.5	14	280.0
<b>Total</b>	<b>2,509</b>	<b>100.0</b>	<b>3,391</b>	<b>100.0</b>	<b>3,688</b>	<b>100.0</b>	<b>1,179</b>	<b>47.0</b>

Source: City Director's Office (City Administrative Officer), Mwanza City, 2016

#### 4.8 Health Facilities

Mwanza city, like other councils in the region, has done great achievements in the health sector by improving the availability of health facilities (Figure 5.1) and other medical equipment. **Figure 15** shows that public health facilities increased from 4 in 2002 to 14 facilities (a hospital, 2 health facilities and 11 dispensaries) in 2012 and reached 18 facilities (2 hospitals, 2 health centres and 14 dispensaries) in 2015. One general observation is that, the city also similar problem of having uneven distribution of health facilities like other councils in the Region.

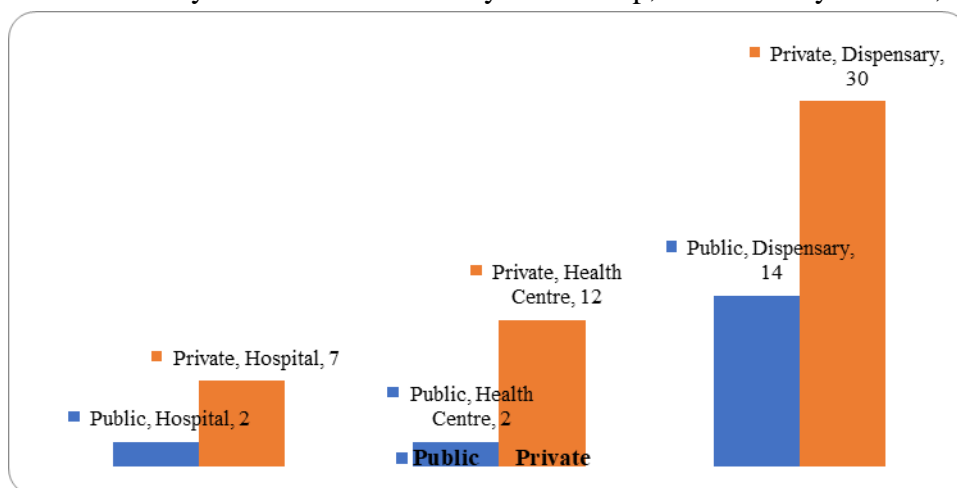
Figure 15: Availability of Health Facilities by Type, Mwanza city council; 2002, 2009 and 2015



**Source:** City Director’s Office, City Medical Office, Mwanza city council, 2016

Looking at ownership, private participation in the provision of health services as emerged by the health policy is significant in Mwanza city council. **Figure 16** shows that, out of 57 health facilities, 39 facilities, equivalent to 28.7 percent are privately owned; 10 are hospitals, 23 health centers and 73 dispensaries.

Figure 16: Availability of Health Facilities by Ownership, Mwanza city council; 2015



**Source:** City Director’s Office, City Medical Office, Mwanza city council, 2016

Besides achievement reached so far in health sector, the city is still lagging behind in the implementation of health policy under which each ward has to have a health center and have a dispensary in each mtaa. Table 5.1 shows that Mwanza city has the biggest shortages of both public health centers and dispensaries, as of now one health centre servicing almost 10 wards and each dispensary facilitating 14 mitaa. Only two wards, namely Mirongo and Igoma had public health centre each and 14 out of 175 mitaa had at least a public dispensary (**Table 19**). One general observation in this sector is that, the observed shortages have been reduced by the participation of private sector and reached to less than a ward and 4 mitaa per health centre a dispensary respectively.

The proposed project will make it easy for people (especially patients and workers) to easily access the health facilities found along the Igoma – Kishiri – Buhongwa road because cheap and fast means of transport will increase.

Table 19: Distribution of Public Health Facilities by Administrative Unit, Mwanza City Council; 2015

Ward	No. of Mitaa	Public Facilities				Total (Public and Private) Facilities			
		No. of Health Centres	No. of Dispensaries	Average Ward per HC	Average Mitaa per Dispensary	No. of Health Centres	No. of Dispensaries	Average Ward per HC	Average Mitaa per Dispensary
Pamba		0	1	0	0	1	2	0.5	0
Nyamagana		0	1	0	0	1	3	0.3	0
Isamilo		0	0	0	0	2	1	1.0	0
Mirongo		1	0	1	0	3	0	0.0	0
Mbugani		0	1	0	0	1	4	0.3	0
Mabatini		0	0	0	0	1	2	0.5	0
Mhandu		0	0	0	0	0	1	1.0	0
Mkolani		0	3	0	0	0	4	0.3	0
Nyegezi		0	0	0	0	0	1	1.0	0
Butimba		0	1	0	0	1	4	0.3	0
Mahina		0	1	0	0	1	3	0.3	0
Igogo		0	1	0	0	0	3	0.3	0
Igoma		1	1	1	0	2	6	0.2	0
Mkuyuni		0	0	0	0	0	1	1.0	0
Luchelele		0	1	0	0	0	5	0.2	0
Buhongwa		0	2	0	0	1	2	0.5	0
Kishiri		0	0	0	0	0	0	0.0	0
Lwanhinma		0	1	0	0	0	2	0.5	0
<b>Total</b>	<b>175</b>	<b>2</b>	<b>14</b>	<b>1.4</b>	<b>12.5</b>	<b>14</b>	<b>44</b>	<b>0.4</b>	<b>4.0</b>

*Source: City Director's Office, City Medical Office, Mwanza city council, 2016*

## 4.9 Production Sectors

### 4.9.1 Distribution of Arable Land

Many places observed in urbanizing Mwanza City Council is associated with the increase of surveyed plots for human settlements, business centres, social services, infrastructures and industries. This affected much on land size planted with food crops or cash crops. Arable land is the land that is suitable for growing crops. Out of the city council's total land area of 12,155 hectares, 3,473 hectares was arable land (**Table 20**). Moreover, out of the arable land, only 92.8 per cent (3,223ha) of the arable land is underutilization. From the table, the wards with higher utilization of arable land were Igoma (100 per cent), Kishiri (100 per cent), Mhandu (97.4 per cent), Buhongwa (93.9 per cent), Lwanhima (92.3 per cent), Mahina (82.6 per cent), Igogo (Butimba (50.0 percent) and Mkuyuni (12.3 per cent). On the other hand, pure urban wards which did not involve in utilization of arable land were Luchelele, Nyegezi, Pamba, Nyamagana, Mirongo, Mabatini and Mbugani.

The proposed project will not take any part of the arable land.

Table 20: Distribution of Arable Land (ha) by Ward, Mwanza City Council; 2015

Ward	Total land area (Ha)	Total arable land (Ha)	Arable land under cultivation (Ha)	Percent of arable land under cultivation
Buhongwa	3729	1,323	1242	93.9
Lwanhima	2623	928.6	857.1	92.3
Mkolani	-	-	177.5	-
Luchelele	-	-	-	-
Butimba	1420	344	172	50
Nyegezi	-	-	-	-
Igogo	611.5	41.5	25	60.2
Mkuyuni	802	57.2	7	12.3
Pamba	-	-	-	-
Nyamagana	-	-	-	-
Mirongo	-	-	-	-
Isamilo	-	-	-	-
Mabatini	-	-	-	-
Mbugani	-	-	-	-
Mahina	-	192.5	159	82.6
Mhandu	117	117	114	97.4
Igoma	1430	351	351	100
Kishiri	1,422.20	118.5	118.5	100
<b>Total</b>	<b>12,155</b>	<b>3,473</b>	<b>3,223</b>	<b>92.8</b>

Source: City Director's Office (Agriculture Department), Mwanza City Council, 2016

### 4.10 Major Food Crops

Over the reference period shown in **Table 21**, Mwanza City Council harvested a total of 11,603 tons of major food crops which averaged annually at 3,868 tons. Cassava was the leading food crops in terms of production. It accounted for 36.3 percent of the total

production (11,603 tons). Paddy was the second major food crop with 27.5 percent of the total production followed by sweet potatoes (20.4 percent). Maize was the least important food crop in terms of production (1,836 tons, 15.8 percent) as shown in **Figure 17**.

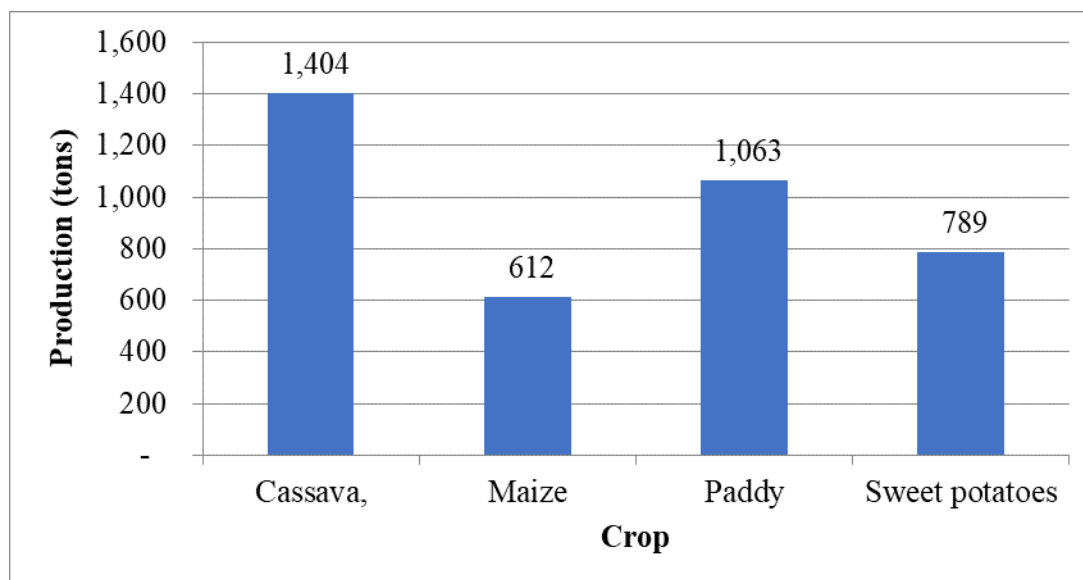
This sector will not be affected by the proposed project.

Table 21: Estimated Production in tons of Major Food Crops; Mwanza City Council; 2010/11 to 2014/15

Crop	Production (tons)			Total	Average per Year	Percent
	2011/12	2012/13	2013/14			
Cassava,	1,404	1,404	1,404	<b>4,212</b>	<b>1,404</b>	<b>36.3</b>
Maize	612	612	612	<b>1,836</b>	<b>612</b>	<b>15.8</b>
Paddy	1,063	1,063	1,063	<b>3,189</b>	<b>1,063</b>	<b>27.5</b>
Sweet potatoes	789	789	789	<b>2,366</b>	<b>789</b>	<b>20.4</b>
<b>Total</b>	<b>3,868</b>	<b>3,868</b>	<b>3,868</b>	<b>11,603</b>	<b>3,868</b>	<b>100</b>
<b>Percent</b>	<b>33.3</b>	<b>33.3</b>	<b>33.3</b>	<b>100</b>		

Source: City Director's Office (Agriculture Department), Mwanza City Council, 2016

Figure 17: Annual Production in tons of Major Food Crops; Mwanza City Council; 2010/11 to 2014/15



Source: City Director's Office (Agriculture Department), Mwanza City Council, 2016

#### 4.10.1 Irrigation Prospects

Irrigation farming in Mwanza City Council is feasible due to availability of some water bodies available. As table 3.5 shows, the whole Mwanza City Council has irrigation potential of 550 ha of which 82ha or 14.9 percent already exploited. The biggest potential area for irrigation found in Buhongwa ward which accounted for 86.5 percent followed by Lwanhima (8.5 percent) and Kishiri (4.9 percent) of the total potential area. However, traditional irrigation schemes are dominant with horticultural crops and paddy, tomatoes, Chinese cabbage being irrigable crops (**Table 22**). This sector will not be affected by the proposed project.

Table 22: Irrigation Prospects by Ward, Mwanza City Council; 2014/15

Ward	Estimated Potential Area (ha) for irrigation	Area (ha) under irrigation	Unutilized potential area (ha)	Percent of potential area
Buhongwa	470	65	405	86.5
Lwanhima	55	15	40	8.5
Kishiri	25	2	23	4.9
<b>Total</b>	<b>550</b>	<b>82</b>	<b>468</b>	<b>100</b>

Source: City Director's Office (Agriculture Department), Mwanza City Council, 2016

#### 4.10.2 Livestock Population

**Table 23** shows estimated livestock population by ward in Mwanza City Council in 2014/15. Poultry counted at 322,054 (157,436 Indigenous chicken and 164,618 Broilers and Layers) was the most populous livestock followed by cattle (15,913), goats (12,678), pigs (3,664), sheep (1,536) and donkeys (33). Majority of livestock populated in Igoma as this ward led in number of cattle (2,786), goats (1,778) and sheep (208). Likewise, largest population of donkeys (33) was observed in Kishiri ward, pigs (882) in Mkolani ward and poultry (42,033) in Butimba ward. This sector will not be affected by the proposed project.

Table 23: Estimated Livestock Population by ward, Mwanza City Council; 2015

Ward	Cattle	Goats	Sheep	Donkeys	Pigs	Indigenous chicken	Chicken (Broilers & Layers)
Igoma	2786	1778	208	0	204	12884	8664
Kishiri	2776	3104	417	33	312	15335	6420
Buhongwa	2250	2163	133	0	476	17100	10200
Pamba	336	453	88	0	62	2821	2060
Mkuyuni	181	103	28	0	158	10336	1700
Mbugani	170	84	18	0	350	2810	30150
Mahina	191	144	21	0	186	2350	3432
Mirongo	6	19	0	0	0	1750	540
Nyamagana	87	92	4	0	18	1314	11060
Mabatini	147	97	22	0	250	11205	6000
Isamilo	98	93	6	0	23	1300	1800
Mkolani	2130	2402	317	0	882	16891	18000
Igogo	127	187	27	0	23	3876	250
Butimba	632	203	63	0	103	10033	32000
Nyegezi	298	143	21	0	111	11223	8600
Luchelele	1302	297	41	0	207	10732	10320
Lwanhima	2104	1115	99	0	189	12345	6122
Mhandu	292	201	23	0	110	13131	7300
<b>Total</b>	<b>15,913</b>	<b>12,678</b>	<b>1,536</b>	<b>33</b>	<b>3,664</b>	<b>157,436</b>	<b>164,618</b>

Source: City Director's Office (Livestock Department), Mwanza City Council, 2016

## 4.11 Natural Resources

Natural resource sector is comprised of forestry, hunting, beekeeping and tourism. The forestry sub sector plays an important role in maintaining ecological balance, protect soils from erosion and conserves water and wildlife. Forests are sources of domestic energy and provide industrial raw materials. Forests also provide useful non-wood products mainly honey and bee wax. Urbanization of Mwanza City Council is accompanied by rapid population growth. Social impact associated to this including changes of natural resources use and economic activity. Protection of natural resources is the most challenging problem facing management of urbanization process in Mwanza City Council. This is true as high urban population growth raised the need for the Mwanza City Council to have adequate planned, surveyed and serviced land for households and public uses which all these processes put more pressure on natural resources. In due cause, balancing urban development and management processes against natural resources protection guiding principles is important for sustainable development of the city council. This sector will be affected by the proposed project since some few trees along the proposed Igoma – Kishiri – Buhongwa road and Mirongo River rehabilitation will be cut to make way for construction.

### 4.11.1 Forestry

Eighteen wards in the city council comprising of Buhongwa, Lwanhima, Mkolani, Luchebele, Butimba, Nyegezi, Igogo, Mkuyuni, Pamba, Nyamagana, Mirongo, Isamilo, Mabatini, Mbugani, Mahina, Mhandu, Igoma and Kishiri had a total of 17,300 hectares of total land area and total natural forest reserves of 1,253 hectares which is equivalent to 7.2 percent of the city council land area. Mkolani has the largest area, (850 hectares) of natural forest reserves followed by Luchebele ward with 150 hectares. Other wards do not possess area under forest reserves including Nyegezi, Igogo, Mkuyuni, Pamba, nyamagana to mention few as shown in **Table 24**.

Table 24: Status of Forest Cover by ward, Mwanza city Council; 2015

Ward	Total Land Area (ha)	Natural forest reserve area (ha)
Buhongwa	31,000	21
Lwanhima	0	30
Mkolani	35,000	850
Luchebele	0	150
Butimba	12,910	80
Nyegezi	0	100
Igogo	10,000	0
Mkuyuni	40,000	0
Pamba	2,000	0
Nyamagana	2,000	0
Mirongo	2,090	0
Isamilo	5,000	20
Mabatini	0	0
Mbugani	4,000	0
Mahina	24,000	2
Mhandu	0	0
Igoma	41,000	0
Kishiri	0	0

<b>Total</b>	<b>17,300</b>	<b>1,253</b>
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Source: City Director's Office (Natural Resources Department), Mwanza City Council, 2016

Though the city council is endowed with inadequate forestry resources due to increasing human activities, high urban population growth raised the need for the Mwanza City Council to have adequately planned, surveyed and serviced land for households and public uses which all these processes put more pressure on natural resources. The city council has taken necessary initiatives of tree planting in order to prevent critical deforestation that might happen in the near future. Various wards were involved in both raising and planting trees in adversely affected areas. A total of 207,365 tree seedlings were planted in Mwanza city council from Mkuyuni ward in 2011. Isamilo ward planted a total of 10,000 tree seedlings in 2013. There was no data for other wards. The forest reserve will not be affected by the proposed project.

#### 4.11.2 Fishery

Tanzania is one of the largest fishing countries in Africa. According to FAO; it is ranked in the top ten countries in terms of total capture fisheries production. Inland production is from water bodies which Lake Victoria is the largest in Africa and the major source for fishing in Mwanza city council. The main location of fishing activities in the city council is Mkuyuni, Nyamagana, Kishiri, Luchelele, Pamba, Igoma, Mhandu and Buhongwa ward. Table 3.21 shows fishery resource facilities and production in 2015. Mwanza city council has large share of Lake Victoria water body but has not yet utilised due to absence of official fish market centres which resulted to the improvement of well-being of fishermen and population of Mwanza city council as a whole.

**Table 25** shows that the city council had 359 fishing licences, 1,077 fishermen and 359 registered fishing vessels. Table 3.21 also shows that a total of 1,722.7 million kilograms of fishes were caught in 2015 and total of TZS 4,544.8 million were earned by Mwanza city council residents. Mkuyuni, Nyamagana and Kishiri were the three giant wards which performance of the sector was significantly observed. While Lwanhima, Mkolani, Butimba, Nyegezi wards to mention few had no fishing activity due to absence of water body.

The proposed road construction project will make it easier for timely transportation of fish products in the areas hence it will have a positive impact on the fishery sector in the city. The proposed rehabilitation of Mirongo River will increase fishing activities along it hence possibly increase fishery production.

Table 25: Fishery Resources and Production by ward from January to December, 2015; Mwanza City Council

Ward	No. of Fishing licences	No. of Fishermen	No. of Registered Fishing Vessels	Fish Production	
				Weight (kg)	Value (Tshs. "000")
Buhongwa	-	-	-	9,600	38,400
Lwanhima	-	-	-	-	-
Mkolani	-	-	-	-	-
Luchelele	227	681	227	28,800	144,000
Butimba	-	-	-	-	-
Nyegezi	-	-	-	-	-



Igogo	-	-	-	-	-
Mkuyuni	132	396	132	1,277,288	2,338,661
Pamba	-	-	-	26,148	130,740
Nyamagana	-	-	-	295,320	1,476,600
Mirongo	-	-	-	-	-
Isamilo	-	-	-	-	-
Mabatini	-	-	-	-	-
Mbugani	-	-	-	-	-
Mahina	-	-	-	-	-
Mhandu	-	-	-	21,000	105,000
Igoma	-	-	-	25,200	125,000
Kishiri	-	-	-	39,360	186,390
<b>Total</b>	<b>359</b>	<b>1,077</b>	<b>359</b>	<b>1,722,716</b>	<b>4,544,791</b>

Source: City Director's Office (Natural Resources Department), Mwanza City Council, 2016

The revenues collected from selling fish products in Mwanza city council for 2013, 2014 and 2015 was Tshs. 302,765,839.64, 40,416,450 and 90,690,000 respectively. There is no improvement of revenue earned by fishermen in the city council when comparing 2013 and 2015 seasons. The revenue earned by fishermen decreased by Tshs. 212,075,839.64 between 2013 and 2015.

#### 4.11.3 Mining Sector

Mining though is an economic activity, so far is not well implemented in the city council. Currently, there are lot of surveys and researches going on in search of existence of mineral deposits in terms of quantity and quality. These surveys and researches are done heavily by foreign companies while local companies are invested in small scales. However, there are small scale extractions of minerals at Buhongwa, Lwanhima, Igoma and Kishiri ward, mostly extracted mineral includes quarrying and sand minerals (**Table 26**). There was no data on distribution of existing mineral deposits in other wards. These minerals are mostly purchased by brokers and dealers in Mwanza City Council.

The proposed project will increase and make easy the transportation of mining products where authorized. Permitted quarrying and sand mining will be one of the activities along the river will benefit Mirongo River and solve the problem of siltation.

Table 26: Distribution of Existing Mineral Deposits and Scale of Mining by ward, Mwanza City Council;2015

Ward	Type of Mineral Deposit	Small Scale	Medium Scale	Large scale
Buhongwa	Aggregate sand	127	-	1
	Rock	59	-	-
Lwanhima	Aggregate sand	2	-	1
	Rock	43	-	-
Mkolani	-	-	-	-

Luchelele	-	-	-	-
Butimba	-	-	-	-
Nyegezi	-	-	-	-
Igogo	-	-	-	-
Mkuyuni	-	-	-	-
Pamba	-	-	-	-
Nyamagana	-	-	-	-
Mirongo	-	-	-	-
Isamilo	-	-	-	-
Mabatini	-	-	-	-
Mbugani	-	-	-	-
Mahina	-	-	-	-
Mhandu	-	-	-	-
Igoma	Agregate sand	46	-	-
	Rock	32	-	-
Kishiri	Agregate sand	27	-	-
	Rock	15	-	-
Total		351		2

Source: City Director's Office (Mining Sector), Mwanza City Council, 2016

#### 4.12 Industrial Production

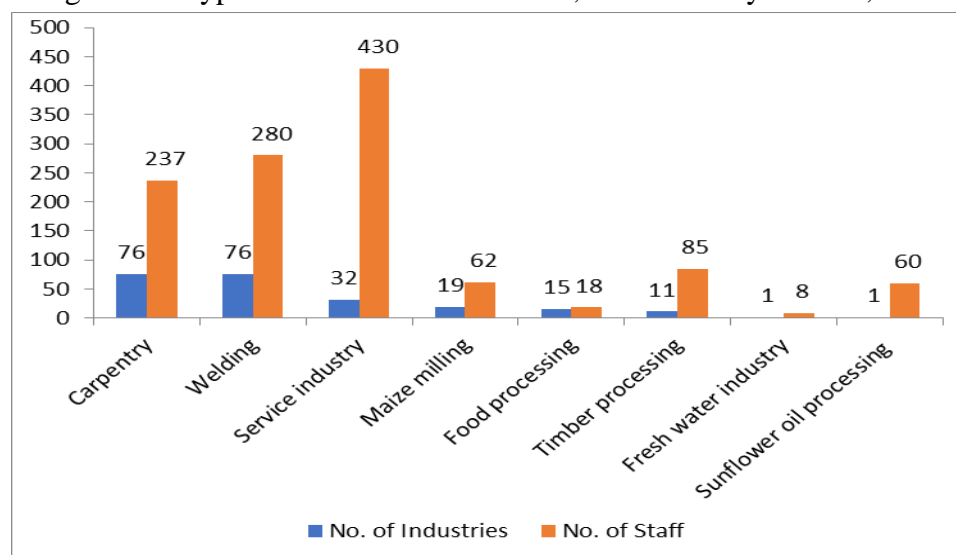
Industries all over Mwanza region are known to play a major role in socio-economic development. This is also the case in Mwanza city council, where industries, mostly small scale contribute significantly to jobs creation, income generation and stimulation of growth in urban areas of the city council. Looking at **Table 27**, by the end of 2015 there were 231 small scale industries employing 1,180 staff. More than thirty percent (i.e., 32.9 percent) of the 76 industries were involved with carpentry. Small scale industries involved with welding counted to have 76 industries (32.9 percent), service industries 32 (13.9 percent) (**Figure 18**). Majority of staff (430 or 36.4 percent of the total staff) were working in service industry - garage while very few of them (8 staff, 0.7 percent) working in fresh water industry.

Table 27: Type of Small-Scale Industries by ward, Mwanza City council; 2015

Type of Industry	Number of Industries	Percent	Total no. of staff	Percent
Carpentry	76	32.9	237	20.1
Welding	76	32.9	280	23.7
Service industry – garage	32	13.9	430	36.4
Maize milling	19	8.2	62	5.3
Food processing	15	6.5	18	1.5
Timber processing	11	4.8	85	7.2
Fresh water industry (Nole)	1	0.4	8	0.7
Sunflower oil processing mill	1	0.4	60	5.1
Total	231	100	1,180	100

Source: City Director's Office (Trade Department), Mwanza City Council, 2016

Figure 18: Type of Small-scale Industries, Mwanza City council; 2015



Source: City Director's Office (Trade Department), Mwanza City Council, 2016

**Table 28** gives a number of medium scale industries which were available in the city council in 2015. The distribution of medium scale industries by ward were as follows: Mhandu (64.9 percent), Igoma (19.3), Nyamagana (7.0 percent), Lwanhima (5.4 percent), Igogo and Mkuyuni with 1.8 percent each, of the total of 57 medium industries which were available in Mwanza City Council in 2015.

Table 28: Type of Medium Scale Industries by ward; Mwanza City Council; 2015

Ward	Type of Industry	Number of industries	Percent
Lwanhima	Pharmaceutical	1	1.8
	Bricks	1	1.8
	Local soap	1	1.8
Igogo	Publisher	1	1.8
Mkuyuni	Magodoro Hasham Jamali	1	1.8
Nyamagana	Maize Milling	2	3.5
	Timber processing	2	3.5
Mhandu	Service Industry	30	52.6
	Capentry	7	12.3
Igoma	Mwanza Fishing	1	1.8
	Eincher Mwanza Branch	3	5.3
	Mabati chapa Kiboko	3	5.3
	Umoja wa wafanyabiashara wa mbao	4	7.0
Total		57	100

Source: City Director's Office (Trade Department), Mwanza City Council, 2016

**Table 29** gives a number of large-scale industries which were available in the city council in 2015. The distribution of large-scale industries by ward were as follows: Igogo (5 industries), Mkuyuni (one industry) and Mahina (one industry) in which a total of 7 large industries were available in Mwanza City Council in 2015.

Table 29: Number of large-scale industries by ward, Mwanza City Council; 2015

Ward	Type of Industry	Number of industries
Igogo	Fishing prod	1
	Poly bags	1
	Vegetable oil industry	1
	Gas plant	1
	Marine seru	1
Mkuyuni	Kiwanda cha magodoro	1
Mahina	Food processing Biscut	1
Total		7

Source: City Director's Office (Trade Department), Mwanza City Council, 2016

The proposed road construction project will have a positive impact on the industrial sector since it will promote its activities by making it easy for raw materials and finished goods to be transported fast and due to accessibility, the market will expand hence increased profit and government revenue.

#### 4.13 Economic Infrastructure

##### 4.13.1 Road network

As indicated in **Table 30**, road network for Mwanza city council in 2015 was about 577 kilometers. Trunk road constitutes 30 kilometers (5.2 percent) of the regional network. The district /council roads constitute 547 kilometers (94.8 percent). Buhongwa ward had the largest road network with the total length of 47 kilometers and Mirongo ward being the least with 9.5 kilometers. Unfortunately, the council had neither regional nor feeder roads.

The proposed road construction project will be advantageous since it will be an addition (14 km) to the bitumen upgraded road network in the city. This means increased accessibility to areas in Igoma, Kishiri and Buhongwa wards.

Table 30: Length of Road Network by ward (in km) Mwanza City Council, 2015

Ward	Type (in km)				
	Trunk	Regional	District/Urban	Feeder	Total
Buhongwa	4	-	43.0	-	47.0
Lwanhima*	0	-	35.0	-	35.0
Mkolani	2	-	42.3	-	44.3
Luchelele*	0	-	39.5	-	39.5
Butimba	2	-	33.4	-	35.4
Nyegezi	1	-	32.6	-	33.6
Igogo	3	-	22.3	-	25.3
Mkuyuni	1.5	-	23.9	-	25.4
Pamba	1	-	25.7	-	26.7
Nyamagana	2	-	26.5	-	28.5
Mirongo	0	-	9.5	-	9.5
Isamilo	2	-	27.3	-	29.3
Mbugani	1	-	13.2	-	14.2

Mabatini*	3	-	15.3	-	18.3
Mahina	2	-	39.8	-	41.8
Mhandu*	1	-	37.2	-	38.2
Igoma	4	-	38.8	-	42.8
Kishiri*	0.5	-	41.8	-	42.3
<b>Total</b>	<b>30</b>	<b>0</b>	<b>547.0</b>	<b>0</b>	<b>577.0</b>
<b>Percent</b>	<b>5.2</b>	<b>0</b>	<b>94.8</b>	<b>0</b>	<b>100</b>

Source: Compiled data from City Executive Director's office, 2016

#### 4.13.2 Railway Transport

Mwanza region is served by the central line railway system that connects Mwanza with Tabora, Kigoma and Dar es Salaam. The importance of the Central Railway system to the region is felt in hauling agricultural and industrial goods to and from the region. Goods transport from the region is to a great magnitude dominated by cotton. This smears for all the railway stations within the region. Railway station within Mwanza City council which serves embarking and disembarking is Mwanza Town Station where passengers are also ferried by this Central Railway System. The information provided by Tanzania Railway Limited shows that a total of 10,232 passengers used the line while as much as 446 tons of cargo was ferried.

The railway transport may be affected by the project during construction because the proposed Igoma – Kishiri – Buhongwa road crosses the railway at Lwanhima. The project will ensure that during the upgrade the railway is restored to its current status and function as it usually does.

### 4.14 Environmental Baseline Information

#### 4.14.1 Water Supply

The topography and existence of Lake Victoria are the main reasons for the reliable sources of water in Mwanza city. The 2002 Population and Housing Census show that the piped water was the main source of drinking water in Mwanza city (71.3 percent) followed by public taps (18.7 percent), protect shallow wells (3.5 percent) and unprotect shallow wells (2.5 percent). However, the council has very small proportions of households who use boreholes, protected spring, springs and others such as surface water and rain water harvesting. Water services are provided by MWAUWASA. The existing water treatment plant located at Capri Point produces between 63,000 - 96,000 m<sup>3</sup>/day. The water supply coverage rate is 65%. The proposed project will have a water use permit to obtain water from Lake Victoria for construction activities which can result to the decreased water level if there will be over abstraction.

#### 4.14.2 Solid Waste Management

Mwanza city does not have good waste disposal system; therefore, there are no proper ways of disposing solid waste. There is only one known landfill for solid waste disposal located at Buhongwa. Moreover, inadequate solid waste dump trucks lead to uncollected garbage which in turn pollute the environment of the city. The proposed project will have a proper solid waste management plan so that it does not add a burden to the existing challenge.

#### 4.14.3 Sanitation

Mwanza city, like other urban cities in the country, is well endowed with both improved and unimproved toilets facilities, the 2012 population and housing census shows Mwanza city

with highest proportion of households with improved toilet facilities categorized as flush toilets (54.1 percent) and ventilated pit latrines (5.2 percent) while 39.6 percent of households in Mwanza city still use traditional pit latrines and 1.1 percent those with no toilets. Very few households have septic tanks and the most common way of disposing human waste is through pit latrines. Moreover, with lack of cesspool emptier and inadequate solid waste dump trucks, over flooding sewage pollute the environment of the City. There are sewerage services provided by MWAUWASA sewage management and other liquid waste. The central sewerage system covers only the central part of the City Centre and a few neighborhoods such as Kirumba and Pasiansi. The wastewater treatment plant located in Ilemela Municipality has a capacity of 7000 m<sup>3</sup>/day. During the project implementation, the proponent will ensure that the project does not affect the sewers along the proposed roads and if it happens so, it should be known to ensure proper reallocation and people are made aware. Also, during construction, the workers will be provided with proper toilet facilities that may temporarily serve them to avoid polluting the environment by open urination and defecation.

#### 4.14.4 Sound levels

Noise level measurement in the selected areas within the project site was done using Environment Test Meter, Model NO9AQ, 4 – in – 1 digital multifunction environment meter with measurement range of 35 to 130 dB. The Sound level metre meets ANSI S1.4 type 2 standards and conforms to IEC 60651 type 2. Equipment accuracy is  $\pm 3.5$  dB of reading. The metre was calibrated using electrical calibration with built-in oscillator (1 kHz sine wave). On taking measurements, the metre was set to the “A” weighed measurement scale, which enables the metre to respond in the same manner as the human ear. The “A” scale is applicable for workplace compliance testing, environmental measurement, and workplace design and law enforcement. The metre was held approximately 1.5 metres above the land and at least 0.5 metre away from hard reflecting surfaces such as walls. A set of three (3) to five (5) readings were taken for Mirongo River and Igoma – Kishiri – Buhongwa road respectively and the selection of individual testing points included areas where people were working and also ensured to capture the centre of noise source as shown on Tables 31 & 32. The lowest and the highest values were recorded and then compared with local standards, Tanzania Bureau of Standards (TBS) and IFC Noise Level Guidelines for Industrial and Commercial receptors. All the results were within the acceptable levels in comparison with TBS and IFC standards. The study took place on 30<sup>th</sup> December, 2022 between 11:30am to 4:20pm for proposed project areas in Mwanza City.

Table 331: Sound Levels Monitoring Data at proposed project site Igoma – Kishiri – Buhongwa Road

Date (dd/mm/yy)	Location	Coordinates (Degrees)	Sound level (dBA) (Accuracy $\pm 3.5$ at 94 dBA)		
			Lowest	Highest	Average
28.12.2022	Buhongwa	S02.624991 E32.948381	42.9	43.5	43.2
28.12.2022	Lwanhima	S02.618021 E32.953543	40.9	41.6	41.3
28.12.2022	Sawha	S02.603945 E32.965402	43.8	44.2	44.0
28.12.2022	Kishiri Centre	S02.573379 E32.988710	46.1	46.7	46.4

28.12.2022	Igoma Centre	S02.573330 E32.988597	47.6	47.8	47.7
<b>Tanzania Standards as per Tanzania Bureau of Standards (TBS) 70 dB(A)</b>					
<b>IFC Noise Level Guidelines for Industrial and commercial receptors 70 dB(A)<sup>6</sup></b>					

Source: Consultant, 2022

Table 332: Sound Levels Monitoring Data at proposed project site along Mirongo River

Date (dd/mm/yy)	Location	Coordinates (Degrees)	Sound level (dBA) (Accuracy $\pm 3.5$ at 94 dBA)		
			Lowest	Highest	Average
29.12.2022	Makongo/BOT	S02.515522 E32.973659	44.1	44.6	44.4
29.12.2022	Azania	S02.524834 E32.977104	59.8	60.1	60.0
29.12.2022	Mabatini	S02.541732 E32.973724	44.4	44.6	44.5
<b>Tanzania Standards as per Tanzania Bureau of Standards (TBS) 70 dB(A)</b>					
<b>IFC Noise Level Guidelines for Industrial and commercial receptors 70 dB(A)<sup>7</sup></b>					

Source: Consultant, 2022

#### 4.14.5 Ambient Air Quality

Ambient air quality was measured using a portable device known as Environment Air quality tester ECO-12. According to the standard Q31/0120000311C003-2018. Adoption of the independently sampled high quality sensors, which can be used to detect CO, NO<sub>2</sub> and CO<sub>2</sub> in ppm, PM<sub>10</sub> in  $\mu\text{g}/\text{m}^3$ , PM<sub>2.5</sub> in  $\mu\text{g}/\text{m}^3$ , TVOC in  $\text{mg}/\text{m}^3$ , temperature and humidity in the environmental air. The study took place on 28<sup>th</sup> – 29<sup>th</sup> December, 2022 between 11:30 pm to 4:20 pm for the proposed Igoma – Kishiri – Buhongwa road and Mirongo River. The equipment was held 1.0m above the ground during measurement, in which reading were recorded at each point to represent the value of that particular point.

The average measured concentration for PM<sub>2.5</sub> and PM<sub>10</sub> found to range between 17 and 39  $\mu\text{g}/\text{m}^3$  and 20 and 72  $\mu\text{g}/\text{m}^3$ , respectively. Based on the results, the average PM<sub>2.5</sub> and PM<sub>10</sub> concentrations measured at all stations were below the respective standards stipulated by TBS, WHO/IFS and Environmental Management (Air Quality Standards) Regulations, 2007 presented in Table 33 & 34. The average measured concentrations of Total Volatile Organic Compounds (TVOC), Carbon monoxide (CO) in ppm, Nitrogen dioxide (NO<sub>2</sub>) in ppm and Carbon dioxide (CO<sub>2</sub>) presented in Table 33 & 34. All the measured parameters were within the stipulated guidelines, i.e., WHO/IFC ambient air quality guidelines and safe for human health and the surrounding environment. Based on the results, the project is expected to have an impact due to the construction activities.

<sup>6</sup> <https://www.ifc.org/wps/wcm/connect/4a4db1c5-ee97-43ba-99dd-8b120b22ea32/1-7%252BNoise.pdf?MOD=AJPERES&CVID=ls4XYBw>

<sup>7</sup> <https://www.ifc.org/wps/wcm/connect/4a4db1c5-ee97-43ba-99dd-8b120b22ea32/1-7%252BNoise.pdf?MOD=AJPERES&CVID=ls4XYBw>

Table 33: Ambient air quality concentrations measured at the proposed Igoma – Kishiri – Buhongwa Road

Location	Coordinates (Degrees)	Measured Dust Parameter ( $\mu\text{g}/\text{m}^3$ )		TVOC ( $\text{mg}/\text{m}^3$ )	NO <sub>2</sub> (ppm)	CO <sub>2</sub> (ppm)	CO (ppm)
		PM <sub>2.5</sub>	PM <sub>10</sub>				
Buhongwa	S02.624991 E32.948381	22	63	0.0	0.0	313	0.0
Lwanhima	S02.618021 E32.953543	17	20	0.09	0.01	316	0.0
Sawha	S02.603945 E32.965402	22	24	0.0	0.05	391	7.0
Kishiri Centre	S02.573379 E32.988710	35	72	0.13	0.03	290	5.0
Igoma Centre	S02.573330 E32.988597	39	45	0.0	0.03	380	17
<b>The Environmental Management (Air Quality Standards) Regulations, 2007 and TBS Standards</b>		<b>40</b>	<b>60 – 90</b>		<b>0.1 ppm for 8 hours of exposure</b>		<b>90 ppm for 15 minutes of exposure</b>
<b>WHO/IFS Standards</b>		<b>25 for 24 – hour mean</b>	<b>50 for 24 – hour mean</b>	<b>0.3 – 0.5</b>	<b>0.3 ppm for 30 minutes of exposure</b>	<b>400 - 1000</b>	<b>90 ppm for 15 minutes of exposure</b>

Source: Consultant, 2022

Table 34: Ambient air quality concentrations measured at 3 locations along the Mirongo River

Location	Coordinates (Degrees)	Measured Dust Parameter ( $\mu\text{g}/\text{m}^3$ )		TVOC ( $\text{mg}/\text{m}^3$ )	NO <sub>2</sub> (ppm)	CO <sub>2</sub> (ppm)	CO (ppm)
		PM <sub>2.5</sub>	PM <sub>10</sub>				
Makongoro/ BOT	S02.515522 E32.973659	17	21	0.1	0.02	342	0.0
Azania	S02.524834 E32.977104	13	15	0.09	0.0	397	0.0
Mabatini	S02.541732 E32.973724	24	27	0.11	0.01	288	0.0
<b>The Environmental Management (Air Quality Standards) Regulations, 2007 and TBS Standards</b>		<b>40</b>	<b>60 – 90</b>		<b>0.1 ppm for 8 hours of exposure</b>		<b>90 ppm for 15 minutes of exposure</b>
<b>WHO/IFS Standards</b>		<b>25 for 24 – hour mean</b>	<b>50 for 24 – hour mean</b>	<b>0.3 – 0.5</b>	<b>0.3 ppm for 30 minutes of exposure</b>	<b>400 - 1000</b>	<b>90 ppm for 15 minutes of exposure</b>

Source: Consultant, 2022



#### 4.14.6 Temperature and Relative humidity

Temperature and Relative Humidity measurements in the selected areas within the project site were done using Environment Test Meter, Model NO9AQ, 4 – in – 1 digital multifunction environment meter with measurement range of -20°C to +750°C (-4°F to +1382°F) for temperature and 25% to 95% Relative Humidity (RH). Equipment accuracy is  $\pm 3/3.5\%$  reading  $\pm 2^\circ\text{C}$  (at  $-20^\circ\text{C}\sim+200^\circ\text{C}$ ) and  $\pm 5\%$  RH (at  $25^\circ\text{C}$ ,  $35\%\sim 95\%$  RH) for temperature and relative humidity respectively. The metre was calibrated using electrical calibration with built-in oscillator (1 kHz sine wave). On taking measurements, the metre was set to the “(Fahrenheit degree (°F))” measurement scale for temperature and percentage for relative humidity, which enables the metre to respond in the same manner as the atmospheric conditions. These scales are applicable for workplace compliance testing, environmental measurement, and workplace design and law enforcement. The metre was held approximately 1.5 metres above the land and at least 5 metres away from hot objects. A set of two (2) to four (4) readings were taken per points and the selection of individual testing points included areas where people were working and also ensured to capture the centre of project. The values were recorded and then compared with meteorological data from Tanzania Meteorological Authority (TMA). The study took place from 28<sup>th</sup> – 29<sup>th</sup> December, 2022 between 10:30am to 18:20 pm for proposed project areas in Mwanza City.

Table 335: Temperature and Relative Humidity Monitoring Data along the proposed Igoma – Kishiri – Buhongwa Road project site

<b>Date</b> (dd/mm/yy)	<b>Location</b>	<b>Coordinates</b> (Degrees)	<b>Temperature</b> (°C)	<b>Relative Humidity</b> (%)
28.12.2022	Buhongwa	S02.624991 E32.948381	27.1	61.7
28.12.2022	Lwanhima	S02.618021 E32.953543	27.0	70.6
28.12.2022	Sawha	S02.603945 E32.965402	25.4	69.3
28.12.2022	Kishiri Centre	S02.573379 E32.988710	25.6	67.2
28.12.2022	Igoma Centre	S02.573330 E32.988597	25.0	73.3

Source: Consultant, 2022

Table 36: Temperature and Relative Humidity Monitoring Data along Mirongo River

<b>Date</b> (dd/mm/yy)	<b>Location</b>	<b>Coordinates</b> (Degrees)	<b>Temperature</b> (°C)	<b>Relative Humidity</b> (%)
29.12.2022	Makongoro/BOT	S02.515522 E32.973659	22.2	81.5
29.12.2022	Azania	S02.524834 E32.977104	21.8	91.8
29.12.2022	Mabatini	S02.541732 E32.973724	21.4	92.4

Source: Consultant, 2022

#### 4.14.7 Combustion Gaseous Emission Concentrations (Flue gases)

There is no official record of secondary flue gas emission data due to non-availability of a regular flue gas emission monitoring program for flue gas conditions or emissions. The main sources of air pollutant emissions are from diffuse sources such as combustion of carbon-containing fuels in a limited oxygen gas supply. Air quality was measured under this project. The samples were collected from onsite points of the project site by using Digital Gas Analyser HD4400. The present condition of the air quality is presented in Table 1 for all proposed road project sites. From the test results, it is found that the site has no gaseous contaminants of all flue gases such as Sulphur dioxide (SO<sub>2</sub>), Carbon monoxide (CO) and Nitrogen oxides (NO/NO<sub>x</sub>). On the other hand, flue temperature content was far below air temperature and the atmospheric environmental standards for both the residential and industrial areas thus; were within acceptable Tanzania Bureau of Standards (TBS) limits. This Environmental and Social Impact Assessment (ESIA) used the Tanzanian standards TZS 845:2019(E) Air Quality – Specification<sup>8</sup> and this is one of the nine compulsory environmental standards developed by the Tanzania Bureau of Standards and collated in the National Environmental Standards Compendium. In general, the air quality standards contain the same tables of limit or guideline values as the regulations as shown on Tables 37 & 38.

Table 37: Findings of Flue gases at proposed Igoma – Kishiri – Buhongwa Road project site

Date (dd/mm/yy)	Sampling point	Coordinates	Flue Temperature (°F)	Air Temperature (°F)	O <sub>2</sub> (%)	CO (ppm)	NO (ppm)	NO <sub>x</sub> (ppm)	SO <sub>2</sub> (ppm)	Temperature Difference (°F)
28.12.2022	Buhongwa	S02.624991 E32.948381	75.60	81.70	20.90	0.00	0.00	1.05	0.00	-6.1
28.12.2022	Lwanhima	S02.618021 E32.953543	74.80	80.10	20.90	0.00	0.00	1.05	0.00	-5.3
28.12.2022	Sawha	S02.603945 E32.965402	74.50	78.60	20.90	0.00	0.00	1.05	0.00	-4.1
28.12.2022	Kishiri Centre	S02.573379 E32.988710	74.50	79.50	20.90	0.00	0.00	1.05	0.00	-5.0
28.12.2022	Igoma Centre	S02.573330 E32.988597	75.90	81.50	20.90	7.00	0.00	1.05	0.00	-5.6
<b>Tanzania Bureau of Standards (TBS) Limits</b>			-	-	-	<b>0.01</b>	<b>0.00012</b>	<b>0.00012</b>	<b>0.0005</b>	

Source: Primary data/Consultant, 2022

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<https://www.tbs.go.tz/uploads/files/list%20of%20compulsory%20tanzania%20standard%20as%20of%20september%202021.pdf>

Table 38: Findings of Flue gases at proposed project site – along Mirongo River

Date (dd/mm/yy)	Sampling point	Coordinates	Flue Temperature (°F)	Air Temperature (°F)	O <sub>2</sub> (%)	CO (ppm)	NO (ppm)	NO <sub>x</sub> (ppm)	SO <sub>2</sub> (ppm)	Temperature Difference (°F)
29.12.2022	Makongoro/ BOT	S02.515522 E32.973659	66.6	74.8	20.90	0.00	0.00	1.05	0.00	-8.2
29.12.2022	Azania	S02.524834 E32.977104	67.6	74.5	20.90	0.00	0.00	1.05	0.00	-6.9
29.12.2022	Mabatini	S02.541732 E32.973724	66.9	72.9	20.90	0.00	0.00	1.05	0.00	-6.0
<b>Tanzania Bureau of Standards (TBS) Limits</b>			-	-	-	<b>0.01</b>	<b>0.00012</b>	<b>0.00012</b>	<b>0.0005</b>	

Source: Primary data/Consultant, 2022

#### 4.14.8 Ground Vibrations

Ground vibrations were measured at 5 locations of the proposed Igoma – Kishiri – Buhongwa Road and 3 points of the proposed Mirongo River project site that represented onsite and offsite receptors. The detached probe-type vibration meter model TA8663 was utilized to quantify the ground vibration in the study area. The meter has an accuracy of  $\pm 5\%$   $\pm 2$  digits, acceleration of 1-199.9 m/s<sup>2</sup>, a wide frequency ranges of 1 Hz to 15 kHz for capturing almost all possible vibrations for workplace assessments. This meter adopts piezoelectric effect of artificial polarized ceramic for design. It is suitable for monitoring all kinds of vibrating mechanical facilities, especially the vibration measurement of rotating and reciprocating machinery. Based on ground vibrations measurements collected, the average recorded levels were 0.082 and 0.867 mm/s for the road and Mirongo River respectively (Table 39 & 40). The proposed project has the potential to increase the ground vibration levels from its construction activities like movements of heavy equipment and trucks, etc. and later when the road starts operating.

Table 349: Ground vibrations levels along the proposed Igoma – Kishiri – Buhongwa Road project site

Location	Coordinates (Degrees)	Ground vibrations (mm/s)
Buhongwa	S02.624991 E32.948381	1.0
Lwanhima	S02.618021 E32.953543	0.7
Sawha	S02.603945 E32.965402	0.5
Kishiri Centre	S02.573379 E32.988710	0.7
Igoma Centre	S02.573330 E32.988597	1.2
<b>Average</b>		<b>0.82</b>
<b>Environmental Management (Standards for the Control of Noise and Vibrations Pollution) Regulations, 2015</b>		<b>5 mm/s PPV at all times</b>

Source: Consultant, 2022

Table 40: Ground vibrations levels along the proposed Mirongo River project site

Location	Coordinates (Degrees)	Ground vibrations (mm/s)
Makongoro/BOT	S02.515522 E32.973659	0.9
Azania	S02.524834 E32.977104	1.0
Mabatini	S02.541732 E32.973724	0.7
<b>Average</b>		0.867
<b>Environmental Management (Standards for the Control of Noise and Vibrations Pollution) Regulations, 2015</b>		<b>5 mm/s PPV at all times</b>

Source: Consultant, 2022

#### 4.14.9 Water Quality Mirongo River

Mirongo River rehabilitation is one of the proposed projects in Mwanza city. Water quality analysis of the river was carried out in order to establish a basis for monitoring of the quality changes of the river water that may be resulted the proposed project activities and human activities. Onsite water quality analysis of the Mirongo River was carried out to determine pH, electrical conductivity (EC), total dissolved solids (TDS) and Dissolved Oxygen (DO) by using portable pH meter, e-1 portable TDS and EC meter and a digital DO meter (Model 51970-88, Hach Co., USA) respectively. The average levels of determined pH, EC, TDS and DO of 3 water samples drawn from 3 different points of the river were 7.39, 778.3  $\mu\text{S}/\text{cm}$ , 389 mg/L and 7.13 mg/L respectively. The results were all within the acceptable TBS and WHO standards for water quality. Therefore, the proponent will be required to carry regular monitoring in order to ensure these levels are not altered to above the standards and cause aesthetic problems to the river and Lake Victoria as well as affect their ecosystem.

Table 41: Water quality finding of Mirongo River in comparison with TBS/WHO standards

Sampling point	Coordinates	pH	EC ( $\mu\text{S}/\text{cm}$ )	TDS (mg/L)	DO (mg/L)
Makongoro/BOT	S02.515522 E32.973659	7.47	750	375	6.7
Azania	S02.524834 E32.977104	7.33	878	439	7.5
Mabatini	S02.541732 E32.973724	7.37	707	353	7.2
<b>Average</b>		<b>7.39</b>	<b>778.3</b>	<b>389</b>	<b>7.13</b>
<b>TBS standards</b>		<b>6.5 – 8.5</b>	<b>-</b>	<b>1000</b>	<b>-</b>
<b>WHO standards</b>		<b>6.5 – 9.2</b>	<b>2500</b>	<b>1000</b>	<b>-</b>

## CHAPTER FIVE

### STAKEHOLDER CONSULTATIONS AND PUBLIC INVOLVEMENT

#### 5.1 Introduction

Public consultation is an essential requirement of the environmental impact assessment process; its aim is to ensure the public acceptance of the project as well as to limit adverse impacts; it also helps to uncover issues that the preparation team may not have been identified nor addressed in the ESIA. If the community participates in the early stages of project preparation, then it should be possible to develop a close relationship between the community and the project team, thereby allowing the community to put forward valuable proposals before project implementation.

##### 5.1.1 Objectives of the Stakeholder Consultation

The Objectives of public consultation are to:

- Share information about project components and proposed project activities with the community in the project areas, and also with relevant stakeholders.
- Gather different viewpoints and opinions, and to understand the concerns and sensitivities of local authorities and communities on environmental problems in the project areas, especially problems which were not identified by the ESIA team. Using this information, public concerns can be addressed in time, during project design and when selection between alternative solutions are made
- Perform a thorough and comprehensive evaluation of all environmental impacts and propose the most effective mitigation measures that exactly address the expected adverse environmental impacts of the project.

#### 5.2 Public Consultation Process

##### 5.2.1 Stakeholders Consulted

Preparatory activities conducted by the team of consultants aimed at engaging the stakeholders to take full part in the consultation process. This included sending information to Wards leaders requesting their assistance in the preparation of public meetings within their respective constituencies. Stakeholders' consultations done at Government Authorities, ward level and Mtaa located along the proposed roads within Mwanza City Council. The comments received and issues raised from these public participation exercises have incorporated to enrich the report and the list of participants with their signatures are attached as **Appendix III** for reference. Indeed, the consultations greatly helped in determining mitigation measures for the project.

Different groups of people in the project areas participated fully in the public consultative meetings during the Study, the categories of interested people who participated are as exemplified but not limited to the following;

- Mwanza City Council Office (City Director with all the project teams)
- Mwanza Water Supply and Sanitation Authority (MWAUWASA)
- TANESCO Mwanza Regional Office
- Tanzania Forest Services Agency (TFS)
- Lake Victoria Basin Water Board (LVBWB)

- Beach Management Unit (BMU)
- Association of drivers using the proposed road
- Nyamagana ward and mtaa leaders (for Mirongo river),
- Mirongo ward and mtaa leaders (For Mirongo river),
- Mbugani ward and mtaa leaders (for Mirongo river),
- Mabatini ward and mtaa leaders (for Mirongo river),
- Igoma ward and mtaa leaders (for the road),
- Kishiri ward and mtaa leaders (for the road),
- Buhongwa ward and mtaa leaders (for the road),
- Communities along the project areas in Nyamagana, Mirongo, Mbugani, Mabatini wards (for Mirongo river) and Igoma, Kishiri and Buhongwa wards (for the road).

### 5.2.2 Public Meetings with Local People

The meetings intended to ensure that the communities near the project roads discuss issues related to the construction of the roads in an open manner thus fostering a community participatory approach prior to project implementation. Clarifications and affirmations made with regard to the expected impacts on individuals and community in general (**Figure 19**).



Figure 19: Meeting with the local leaders and representatives of wards and community members for the construction of Igoma-Buhongwa road and Mirongo river.

### 5.2.3 Summary of Key Issues Discussed

Key issues raised by stakeholders were as summarized here under.

**Stakeholders' categorization:** It was suggested that all stakeholders should be visited and their recommendations and concern gathered to ensure that there are no complaints or

grievance at later stage of project development. Issues of proof of ownership of land where these projects will be implemented was also emphasized to avoid conflicts over land ownership.

***Designs to consider various climatic and social issues:*** It was suggested that designs of the proposed infrastructures should take into consideration various factors such as social issues concern especially those related to people with disabilities and climatic factors especially the hot seasons. People with disabilities requested that all the necessary features used by them and other disadvantaged group be included in order to make the roads user friendly for all groups.

***Interaction between local communities and influx of labours during construction should be monitored:*** Representatives of local communities are concerned about the impact which might be caused by the influx of labours during construction which might lead to increased cases of violence, HIV/AIDS and social unrest. The representatives emphasized on the need for the City and all other concerned stakeholders to ensure that contractors workers and labourers are well managed to avoid any cases of social unrest within the community.

The concerns and comments of all stakeholders were recorded and are presented here in **Table 31.**

Table 35: Stakeholders concerns on the proposed upgrading on Igoma-Kishiri-Buhongwa road and the Mirongo river in Mwanza City Council

S/N	STAKEHOLDERS	VIEWS/ CONCERNS/QUESTIONS	RESPONSE
<b>Consultation Workshop on TACTIC subprojects investments with Wards and Mtaa leaders at St. Dominic Nyakahoja Hall in Mwanza City</b>			
<b>a. Rehabilitation of Mirongo River:</b> The river passes through four wards of Nyamagana, Mirongo, Mbugani and Mabatini			
.	<p><b>Ward Councilors</b></p> <ul style="list-style-type: none"> <li>- Hamad Daudi (Mirongo)</li> <li>- Nassoro Hemed (Nyamagana)</li> <li>- Michael F. Masongo (Ag. Mbugani)</li> <li>- Ntobi B. Ntobi (Mabatini)</li> </ul> <p><b>Ward Executive Officers:</b></p> <ul style="list-style-type: none"> <li>- Eva G Masunga (Nyamagana)</li> <li>- Saimon Fulko (Mirongo)</li> <li>- Shadrack N Mboje (Mbugani)</li> <li>- Lilian N Macha (Mabatini)</li> </ul> <p><b>Community Development Officers</b></p> <ul style="list-style-type: none"> <li>- Charles L. Keah (Nyamagana)</li> <li>- Habby K. Ndaki (Mbugani)</li> </ul> <p><b>Environmental Health Officers</b></p> <ul style="list-style-type: none"> <li>- Florence Rugarabamu (Nyamagana)</li> <li>- Robert Moses (Mabatini)</li> <li>- Ngolla A Masanja (Mbugani)</li> </ul> <p><b>Mitaa Chairpersons:</b></p> <ul style="list-style-type: none"> <li>- Kalis Mrthias, (Nyamagana)</li> <li>- Hassan Maulid,</li> </ul>	<ul style="list-style-type: none"> <li>• They are very happy because the local government authorities and community have been involved from early stages which is very important for the project to be successful.</li> <li>• Environment education should be provided and all wards and communities in which river Mirongo passes should be fully directly involved and to create a sense of ownership and for project sustainability.</li> <li>• PIU should create subproject community committees to assist in implementation and monitoring and create a sense of community ownership.</li> <li>• Environmental law wasn't observed when developing the areas along the river banks as there is significant number of encroachers who have constructed the houses and other structures on the river banks and some of these houses discharge sewage water directly into the river.</li> <li>• During the night people dispose solid waste into the river.</li> <li>• Also, there are many activities undertaken along the river banks such as garages, car wash, petty trading, food vending, sand mining and bricks making which contributes to the pollution of the river.</li> <li>• The project is good as after rehabilitation and beautification the river can be used for recreational purposes and city tourism.</li> <li>• Currently there is a problem of flooding at Mabatini, and Uhuru areas.</li> <li>• At area, storm water drainage channel is too small to accommodate</li> </ul>	<ul style="list-style-type: none"> <li>• The city council served them notices to demolish them and vacate the area but they are still there e.g., areas like Daraja la Wamasai</li> <li>• There will be a continuous communication and engagement of local government leaders on every stage of project implementation.</li> <li>• During the project implementation at all stages wastes shall be well managed by the contractor and</li> </ul>



<ul style="list-style-type: none"> <li>- Athumani Hussein,</li> <li>- Steven D. Mkama,</li> <li>- Raphael M Seleja,</li> <li>- Cleopha P. Chacha (Mabatini)</li> <li>- Ahmed Bisanga (Mirongo)</li> <li>- Emmanuel Pesatatu, and</li> <li>- Chuki Hussein (Mbugani)</li> </ul> <p><b>Mtaa Executive Officers</b></p> <ul style="list-style-type: none"> <li>- Vumilia Tirutoza (Nyamagana)</li> <li>- Winifrida Wanyancha (Mbugani)</li> <li>- Joyce Sunguruma (Mbugani)</li> <li>- Mary C Valerian (Mirongo)</li> <li>- Sato M. Mhoja (Mirongo)</li> <li>- Magdalena K. Ismail (Mirongo)</li> <li>- Hilda B. Massawe (Mabatini)</li> </ul>	<p>all the waters and causes flooding at Mabatini market.</p> <ul style="list-style-type: none"> <li>• The rehabilitation of the river should include rehabilitation and upgrading of all bridges crossing the river by increasing their heights.</li> <li>• Bridges crossing Mirongo river have no pedestrian walkways which threaten their safety.</li> <li>• The proposed rehabilitation should include rehabilitation and construction of new storm water drainage channels that discharge their waters into the Mirongo river in order to control water flow and floods.</li> <li>• Manholes and frontline drains should be provided with inlet filters to prevent solid waste from entering the river.</li> <li>• Contractors should avoid destruction of other utilities during implementation of the project.</li> <li>• Rehabilitation of Mirongo river should also include Ilemela municipality as the river passes there as well.</li> <li>• MWAUWASA infrastructures crossing the rivers should be well maintained and enough space between clean water and sewage water to avoid contamination.</li> <li>• Lastly, the stakeholders wanted to know when the project will start.</li> </ul>	<p>ensure that the environment within and around the proposed project areas are kept clean.</p>
<b>b. Upgrading of Igoma – Kishiri – Buhongwa (14KM) Road</b>		
<p>The road passes three wards Buhongwa, Kishihiri and Igoma.</p> <ul style="list-style-type: none"> <li>- Joseph B Kabadi (Buhongwa Ward Councilor)</li> <li>- Aden Rutandula (WEO-Igoma ward)</li> <li>- Heaven P Mauki (WEO-Buhongwa)</li> <li>- Hamis Maluli</li> </ul> <p><b>Chairman/persons from streets</b></p>	<ul style="list-style-type: none"> <li>• The ward and mtaa leaders and general were engaged by the council therefore they are aware of the project and are readily waiting.</li> <li>• The utility institutions should be involved in the process so that the project can go hand in hand with any change or reallocation of utilities.</li> <li>• Road corridor should be reduced to minimize resettlement especially from Buhongwa Relini to Buhongwa Center.</li> <li>• Relocation issues should be communicated very early as there are people who are currently processing the title deeds for their lands.</li> <li>• The design should follow the existing road alignment and road signs</li> </ul>	<ul style="list-style-type: none"> <li>• The proponent shall ensure proper procedures are followed and necessary costs for relocation of utilities are paid for and people well compensated.</li> <li>• The designs of the</li> </ul>

<ul style="list-style-type: none"> <li>- Fadhili Emmanuel (Igoma)</li> <li>- Ruth Lishinhu (Igoma)</li> <li>- Simon I Dollo (Buhongwa)</li> <li>- Hamisi R Mnjia (Buhongwa)</li> <li>- Adriano J Ngodoki (Igoma)</li> <li>- Boniphace A Manon (Igoma)</li> <li>- Masai Misinzo (Igoma)</li> <li>- Yusufu M. Msalanga (Buhongwa)</li> </ul> <p><b>Mtaa executive Officers</b></p> <ul style="list-style-type: none"> <li>- Cyriacus J. Kaiga (Igoma)</li> <li>- Beatrice Benjamin (Igoma)</li> <li>- Neema M. Stephen (Buhongwa)</li> <li>- Janeth J. Makoye (Igoma)</li> <li>- Gregory Hunja (Kishihiri)</li> <li>- Scholastic F. Shayo (Kishihiri)</li> <li>- Eva S. Buswambiro (Igoma)</li> </ul> <p><b>Community Development Officer</b></p> <ul style="list-style-type: none"> <li>- Moshi Masinde (Buhongwa)</li> <li>- Mariam M. Mdesa (Igoma)</li> </ul> <p><b>Environmental Health Officer</b></p> <ul style="list-style-type: none"> <li>- Advin J. Maingu (Buhongwa)</li> <li>- Chiku Makwea (Igoma)</li> </ul>	<p>should be provided</p> <ul style="list-style-type: none"> <li>• The wayleave corridor should be clearly known at this stage to avoid uncertainties on the corridor of the impact and unnecessary conflicts with the city council.</li> <li>• The road design should consider a provision of a roundabout at Kishiri center where three roads meet and pedestrian crossing bridges in areas where a significant number of people crosses the road.</li> <li>• The road should also connect to Igoma market so that the commuter buses to Buhongwa pass there.</li> <li>• The design should include a construction of min bus terminal at Buhongwa.</li> <li>• Road Construction should include the construction of drainage channels and avoid directing water to peoples’ settlements as it was done at Igoma Kati area.</li> <li>• Storm water drainages should be wide and deep enough to accommodate the flow.</li> <li>• All deteriorated drainage channels should be rehabilitated.</li> <li>• The design should also include provision of culverts in all lowland areas</li> <li>• Skip bins should be provided to facilitate solid waste management.</li> <li>• The contractors should observe the other utilities existing on the RoW to avoid service cut-off.</li> </ul>	<p>proposed project shall accommodate all the required facilities to ensure that the needs of all types of people are accommodated hence served well and the environment is protected and the city’s scenery is improved.</p>
<p><b>MWAUWASA</b></p> <ul style="list-style-type: none"> <li>- Eng. Salim Lossindilo (Director of Water Supply and Sanitation - DWSS)</li> </ul>	<ul style="list-style-type: none"> <li>• There are MWAUWASA infrastructures for water supply and sewerage in the proposed project area.</li> <li>• The pipes must be placed in the road sides and not anywhere else.</li> <li>• There are pipes for clean water supply along the proposed Igoma – Kishiri road, the proponent should ensure that all of them are</li> </ul>	<ul style="list-style-type: none"> <li>• The proponent shall liaise with the contractor to make sure that all the necessary procedures are</li> </ul>

		<p>identified. This will avoid affecting those that may not necessarily need to be relocated and those that may require relocation to be done so in time to avoid water cut problems to the community.</p> <ul style="list-style-type: none"> <li>• Mirongo River needs protection not only against siltation but also pollution. There needs to be a sewer tank along it so that all sewage from different areas/mountains pouring to the river goes to that tank through sewers in it.</li> <li>• There are clean water pipes and sewers that cross the river in some areas which may need to be identified and proper procedures for their relocation/temporal removal during construction to minimize effects that may come with it.</li> </ul>	<p>followed to avoid any losses or effects to the community that may result from affected MWAUWASA infrastructures.</p>
	<p><b>Lake Victoria Basin Water Board (LVBWB)</b></p> <ul style="list-style-type: none"> <li>• Eng. Renatus Shinhu (Basin Water Director)</li> <li>• Batuli Seif (Community Development Officer – CDO)</li> </ul>	<ul style="list-style-type: none"> <li>• The proposed project is beneficial to the city and the country at large.</li> <li>• The proponent shall make sure that the contractor obtains water use/abstraction permit during the mobilization phase prior construction for water obtained directly from sources. This is necessary because a lot of water is used during construction activities such as compaction in road works which cannot be from MWAUWASA but can be obtained either directly from Lake Victoria or Nyashinshi River by using boozers.</li> <li>• The BMU responsible for Mirongo River must be consulted especially during construction phase.</li> <li>• There needs to be a water flow meter to monitor water flow and help with flood control in Mirongo River.</li> <li>• Siltation may result from construction works and also sand and other wastes from such activities should be well managed.</li> <li>• The proponent should ensure people living on the sides along the river are aware of the project and its purpose to avoid conflicts that may arise.</li> </ul>	<ul style="list-style-type: none"> <li>• The proponent will take necessary actions to ensure permits are obtained on time and the water sources are not affected by the project activities throughout the implementation phase.</li> </ul>

		<ul style="list-style-type: none"> <li>Water from MWAUWASA is readily available in all areas hence if the proponent may require connection especially during operation phase, they can all get connected.</li> </ul>	
	<p><b>TANESCO - Mwanza Region</b> Eng. Abdallah Mitenda (Ag. Regional Manager)</p>	<ul style="list-style-type: none"> <li>The proposed project will be beneficial since the number of customers will increase and through relocation in some areas TANESCO infrastructures shall be upgraded.</li> <li>There are polls with the reserves of the proposed roads hence may require relocation. The proponent has to bear all the costs for relocation and all works shall be done by the contractor and supervised by TANESCO.</li> </ul>	<ul style="list-style-type: none"> <li>The proponent will make take all these into consideration and work on them accordingly.</li> </ul>
	<p><b>Tanzania Forest Services Agency (TFS)</b>  <ul style="list-style-type: none"> <li>Bakari S. Mohamed (Zonal Manager)</li> <li>Thomas Moshi (Assistant Zonal Manager)</li> </ul> </p>	<ul style="list-style-type: none"> <li>There are no forest reserves in the proposed project area.</li> <li>Natural tree and grass planting on the river bank may be a great strategy to conserve and protect Mirong River. The proponent should consider planting those which are environmentally friendly.</li> <li>Solid waste should be well managed so that no waste is disposed of into the lake or rivers. Where necessary, dustbins and skip buckets should be places along those areas.</li> <li>Environmental conservation education should be provided among the communities this will make the city upgrade of infrastructures more meaningful.</li> <li>Plant trees along the road reserves to protect against possible soil erosions resulting from floods during rainy seasons.</li> <li>There should be stormwater drains along the roads.</li> </ul>	<ul style="list-style-type: none"> <li>The environment shall be well conserved by tree and grass planting where necessary and waste from the project activities shall be well managed.</li> </ul>

<p><b>Beach Management Unit (BMU)</b></p> <ul style="list-style-type: none"> <li>- Lukas Kissibo (Secretary BMU)</li> <li>- Rehema Ain Moyo (Fisheries Officer)</li> <li>- Patricia Mashauri (Fisheries Officer)</li> <li>- Issa Omary (Sanitation Agent)</li> <li>- Mwanahamisi Mfaume (Sanitation Agent)</li> <li>- Mwala Gervas (Sailor)</li> <li>- Rehema Buna (Member)</li> <li>- Elenestina Charles (Member)</li> <li>- Charles L. Fashion (Member)</li> <li>- Salma Kasim (Member)</li> <li>- Emmanuel Danifodi (Member)</li> <li>- Mwajuma Chamulio (Member)</li> <li>- Ikama Magori (Member)</li> <li>- Militoni Wilibadi (Member)</li> <li>- Salumu Masakiwa (Member)</li> <li>- Ibrahim Kajoro Joseph (WEO - Mkuyuni)</li> <li>- Ramadhani Hamisi (MEO - Mkuyuni)</li> <li>- Said Abdallah (Chairperson)</li> </ul>	<ul style="list-style-type: none"> <li>• The project is beneficial.</li> <li>• The proponent should make sure to involve the BMU in all project phases for constructive discussion about the conservation of the Lake Victoria and the rivers around project areas.</li> <li>• The river and the lake should be protected against siltation and pollution during all project phases by having proper waste management strategy.</li> <li>• Ensure proper solid waste and wastewater management so that people do not dispose waste into the river and go further to the lake and pollute it causing death of fish and other creatures due to waste such as chemicals from industrial discharges and plastics.</li> </ul>	<ul style="list-style-type: none"> <li>• The BMU will be fully engaged in the project to ensure that their opinions are accommodated and help with the implementation of the beach conservation strategy to avoid any pollution or other effects to the environment that may result from project activities.</li> </ul>
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## CHAPTER SIX

### ASSESSMENT OF IMPACTS AND IDENTIFICATION OF ALTERNATIVES

#### 6.1 Environmental and Social Risk Classification of the project as per the World Bank ESF

Environmental and social risks are rated as **Substantial** due to environmental and social impacts likely to be caused by project activities. The main impacts of the proposed projects will emanate from the physical construction activities. No major land use change is expected because these activities will be implemented within the Mwanza City Council in existing land uses. Mwanza City Council already have a master plan therefore this project will finance implementation of activities which are already pre-determined within their areas. The cumulative impact of the works and presence of contractors and machinery on the project sites is unknown at the moment, but careful supervision will be needed to avoid accidents, loss of cultural assets and potential conflicts with local communities. Other potential impacts are related to (i) waste generated at construction sites which can pollute land and water bodies (cement mixing areas, metal, wood and paint residues, diesel, used electronics equipment and other residues); open pits in the soil can cause accidents; (ii) food residues can attract disease causing organisms; (iii) cutting of trees to use as building material (although this will not be allowed and construction materials will be supplied with the authorized vendor); (iv) road accidents; amongst others, (v) Health and safety issues especially during construction of Mirongo river.

Review of designs and architectural drawings will include E&S aspects in order to increase safety and reduce negative environmental effects and increase sustainability of the works, which will require strong willingness by the Mwanza City Council and the PORALG to implement the changes in case the proposed mitigation measures need significant changes. Safety aspects specially to deal with the impacts of earth quakes are important to be considered and quality assurance guaranteed. Other potential environmental and social risks and their mitigation measures are elaborated in the relevant section of the appraisal summary. This ESMF for TACTIC project provides for initial risk assessment and classification based on the available documentation and data. Implementation of the project activities will be positive and urgently needed.

#### 6.2 Spatial, Institutional and Temporal boundaries

##### 6.2.1 Spatial Boundaries

The spatial dimension encompasses the geographical spread of the impacts regardless of whether they are short term or long term. The spatial scale considers the receptor environmental component and can be local or broader. Following this, three zones of impacts considered;

*The core impact zone:* This includes the area immediately bordering the project (local). In the case of this project local impacts will include the site of the construction, (borrow areas, quarries and the actual sub projects)

*Immediate impact area:* These are immediate surrounding areas (project wards)

*The zone of influence:* This includes the wider geographical areas that influenced by this project.

### 6.2.2 Institutional Boundaries

Institutionally, the city Director has the mandate to develop and maintain the urban infrastructures in the Mwanza City Council. Its primary function includes the maintenance and development of the infrastructures to support the economic and social development of the council. They will also be responsible for addressing the environmental issues posed by the subprojects. The proposed infrastructures will be under the district engineers while solid waste collection and disposal will be under the district health officers. From the central government line of administration, by virtue of their location, the urban infrastructures to be developed by this project in Mwanza City Council is under the jurisdiction of the District Director.

### 6.2.3 Temporal Boundaries

Temporal boundaries refer to the lifespan and reversibility of impacts. For example, the impact of construction work for the project may be short-lived, but the presence of this infrastructure may have implications that stretch far into the future. Therefore, some of the impacts that may occur during construction, e.g. noise caused by bulldozers will disappear ESIA as soon as the construction phase completed. The construction period will last for not more than 3 years while the operational phase designed for 20 years unless unforeseen event occurs. Also, for a number of reasons the government may wish to do one or several decisions. For instance, abandoning a portion of the infrastructure and creating another one or an alternative portion; and diverting the original course and substituting it with a new one. Other measures are expanding the infrastructure because of several reasons; and if there is a decision for closing the infrastructure permanently then the required activities for decommissioning process will be obligatory.

## 6.3 Impact Identification

The impacts are categorized into pre-Construction phase impacts, construction phase impacts and operational phase impacts. The main receptors of impacts associated with the anticipated infrastructure upgrading include physical resources (hydrology, surface water quality, soils, air quality and noise); ecological resources (vegetation); material assets, public health and safety, aesthetics and landscape.

***The following impacts were identified to be likely to occur during pre-construction phase;***

- Job creation and increased income
- Land expropriation, loss of property and resettlement
- Loss of employment and income

***The following impacts were identified to be likely to occur during construction phase;***

- Job creation and increased income to local community
- Destruction of other infrastructures
- Soil erosion and instability of slopes

- Increased water and soil pollution
- Noise, vibration and air pollution
- Safety and health risks especially for communities living along Mirongo river
- Increase possibilities of road accidents
- Increased waste especially during dredging of Mirongo river
- Loss of scenic quality
- Loss of vegetation
- Child labour
- Increased HIV/AIDS
- Population influx
- Dangers of borrow pits

*The following impacts were identified to be likely to occur during operational phase;*

- Benefits to community resulting from employment
- Improved transport and economy of the people
- Improved community life and services
- Reduced traffic congestion
- Increase property values
- Increased road accidents

The interaction between the intended project activities and the different environmental receptors are summarized in a simplified matrix presented in **Table 32**.

### 6.3.1 Impact Rating

Taking into account the criteria stated in methodology section, A simple matrix with the following ratings was used to determine significance of the identified impacts stated earlier:

- +3 Very high positive impacts
- +2 High positive impacts
- +1 Minor positive impact
- 0 No impacts
- 1 Minor negative impact
- 2 High negative impacts
- 3 Very high negative impact



Table 36: Environmental and Social Impacts Matrix for the Proposed Igoma – Buhongwa Road and Mirongo river drain in Mwanza City Council

S/N	Environmental parameters/Impacts	Impact Rating Criteria					Impact Significance Rating			
		Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact	Mobilization Phase	Construction Phase	Demobilization Phase	Operation and Maintenance
	<b>Negative Impacts</b>									
1.	Land expropriation, loss of property and resettlement	L	ST	R			-3	-2	0	0
2.	Loss of employment and income	L	ST	R			-2	-1	-2	0
3.	Destruction of other infrastructures	L	ST	R			-1	-2	0	0
4.	Soil erosion and instability of slopes	L	ST	R	•		0	-2	-1	0
5.	Increased Water and soil Pollution	L	ST	R			-1	-2	-1	-1
6.	noise, vibration and air pollution	L	MT	R	•		-1	-2	-1	-1
7.	Safety and health risks	L	ST	R			-1	-2	0	+1
8.	Increase road accidents	L	MT	R	•		-1	-2	-1	-2
9.	Increased Waste	L	ST	R			-1	-2	-1	0
10.	Interference to local hydrology (Flooding)	L	LT	R		•	0	-1	0	-2
11.	Loss of Scenic Quality	R	LT	IR		•	-1	-3	-1	-1
12.	Loss of Vegetation	R	LT	R		•	-1	-3	0	0
13.	Child Labour	L	ST	R			-1	-1	-1	-1

14.	Increased HIV/AIDS	R	LT	IR	•	•	-1	-1	-1	0
15.	Population Influx	L	ST	R	•		-1	-1	-1	-1
16.	Visual Intrusion during Construction	L	ST	R			-1	-1	-1	0
17.	Increased Accidents	L	MT	R	•		-1	-1	-1	-1
18.	Dangers of Borrow Pits	L	ST	R			-1	-1	-1	-1
<b>Positive Impacts</b>										
1.	Job creation and increased income	N	MT				+2	+3	+1	+2
2.	Improved Transport and economy of people	R	LT				0	0	0	+3
4.	Reduced traffic congestion	R	LT				0	0	0	+3

Key: Spatial Scale: Local (L), Regional (R), National (N)

Temporal Scale: Short Term (ST), Medium Term (MT), Long Term (LT)

Reversibility: Reversible (R), Irreversible (IR)

Significance: Highly Adverse (-3); Adverse (-2); Mild Adverse (-1); No impact (0); Mild Beneficial (+1); Beneficial (+2); highly Beneficial (+3);

The team focused on significant positive and negative impacts that were rated +2, +3, -2, -3 and developed mitigation measures and ESMP for them.

The following significant impacts were predicted to be likely to occur during pre-construction phase;

- Job creation and increased income

The following significant impacts were predicted to be likely to occur during construction phase;

- Job creation and increased income
- Destruction of other infrastructures
- Soil erosion and instability of slopes
- Increased water and land pollution
- Noise, vibration and air pollution
- Safety and health risks
- Potential for SEA/GBV incidences
- Increase road accidents
- Increased waste
- Loss of scenic quality
- Loss of vegetation

The following significant impacts were predicted to be likely to occur during operational phase;

- Improved transport and economy of people
- Reduced traffic congestion
- Increase road accidents

In the next sections, significant impacts (positive and negative) associated with each phase of the project are discussed or evaluated.

### 6.3.2 Pre- Construction Phase

#### ***Positive Social impacts***

##### ***Job creation and increased income to local communities***

Most of the casual labourers and some skilled workforce recruited from within Mwanza City Council area. In addition, the local people will be selling food and other merchandise to the construction workforce. The utilization of local workmanship will take place for the activities that do not require a high specialization, and in any case, there will be diffusion of knowhow from the more qualified personnel towards the local personnel.

### 6.3.3 Construction Phase Impacts

#### ***Positive Social impacts***

##### ***Job creation and increased income to local communities***

Most of the casual labourers and some skilled workforce recruited from within Mwanza City Council area. In addition, the local people will be selling food and other merchandise to the construction workforce. The utilization of local workmanship will take place for the activities that do not require a high specialization, and in any case, there will be diffusion of knowhow from the more qualified personnel towards the local personnel.

## ***Negative Environmental Impacts***

### ***Destruction of other infrastructures***

Some of the infrastructure such as houses especially those close to Mirongo river, railway lines, pipe network, telephone lines and power lines are either under or near the project sites and destructed during construction. Relocation of these infrastructures is therefore very important for the construction of this project. However, this relocation can cause the following impacts to the community;

- Cost implications to the authorities managing the infrastructures
- Disruption of service to the community provided by these infrastructures

### ***Soil Erosion and Instability of Slopes***

Construction works specially along Mirongo River would accelerate erosion problems in most cut sections. Nevertheless, all cuts in the sloping grounds refurbished firmly and provided with the vegetation cover to reduce the effect of soil erosion.

### ***Increased water and soil pollution***

Whichever construction method used, small-scale and short-term water pollution may result especially at river crossings and during construction of off-road drainage structures. Impacts can also result from accidental spillage of fuels and construction materials, which may pollute both water and soil. Culvert construction may stir riverbed deposits into suspension. Though the large particles may settle quickly, the finer ones will increase the turbidity of surface water sources. The turbidity impacts may be short-term since the stream construction takes place within a few weeks. The roads development will require the creation of drainage channels in order to drain concentrated run-off from the road.

### ***Noise, Vibration and Air Pollution***

Dust will arise from construction site due to excavation work, movement of vehicles, stock piling of materials, operation of crusher and asphalt plants, and general earth works at the site. Exhaust fumes will mainly come from construction plant, machinery and vehicles in operation. Fumes will also come from the processing of asphalt. Dust and fumes will have major direct but short-term impacts during the project construction phase. Along the project sites, the adjacent areas are relatively open, without impediment to air movement hence enhance dilution of air pollutants. For areas away from the construction sites, leafy vegetation should be able to filter out a considerable content of low-level air borne pollutants. Thus, ventilation and vegetation anticipated to lessen the air pollution problem.

Noise and vibration produced by construction vehicles, plant and machinery during delivery of materials, processing of materials, and actual construction work. Due to an increase in activities and number of operational vehicles, the impacts of noise and vibration will cause disturbance to humans and animals as well as birds. Vibration may even cause physical damage to properties near the construction site. The vegetation and loose soil along the roads in the project area have the potential for damping noise and vibration. As such, noise and vibration impacts will have short range – near the construction site.

### ***Increased Wastes***

It is obvious that construction activities are associated with production of wastes. These wastes can either be solid waste or liquid waste. The waste streams are Construction activities and domestic activities of the workers at the camp and site. The solid waste include, spoil,

rubbles, tree logs, metals, glasses, papers etc while the liquid waste include sewage, oils etc. These wastes if not well handled can change the aesthetic nature of the project area and can even lead to water pollution in case of improper disposal of oils.

### ***Loss of Scenic Quality***

Scenic quality deterioration will occur due to stock piling of construction materials and discoloration of plant leaves and houses in the vicinity of the roads due to windblown dust. Excavation work as well as presence of construction vehicles, plant and equipment will also add to scenic quality deterioration. Scenic quality deterioration will also occur off-site, at the sources of construction materials, the quarries and sand mines. If these are not made good they may become an eyesore. Scenic quality deterioration can destroy the economic and aesthetic value of public and/or private property including land. Scenic quality degradation effects will be significant, short term and direct. They will, in spite of everything, be manageable given proper site operation and prior warning as well as issuance of site operation guidelines.

### ***Loss of Vegetation***

Land clearance to obtain the required area for the road facilities especial in by-passes will involve uprooting vegetation, which falls within the area, as well as displacing huge masses of topsoil. This impact is insignificant since most of the existing roads and the area for in the project area have no vegetation at all except for a few which has a few trees and grasses. Apart from that, the project roads shall follow the existing alignments. This impact will be significant for Mirongo River since during construction some vegetation along the river will be removed to make way for the rehabilitation activities.

### ***Negative Social Impacts***

#### ***Safety and Health Risks***

Construction of these sub projects will expose the labourer, the public to bronchial, and other respiratory tract diseases. Also, poor use (or not using at all) of the safety gears during construction phase will result into loss of lives or injuries during construction. The incidence rate of water borne diseases such as cholera and diarrhoea will increase if there will be no proper sanitation practices at the camps.

#### ***Population Influx***

The proposed roads and river rehabilitation project in the city will attract population increase especially in the areas where the projects will be carried out. This is because the project will increase employment opportunities as well as opportunities for other income generating activities. The population influx into the areas would also increase pressure on both resources and social services due to increased demand on the services and resources. This may lead to extra demands for resources which might cause conflicts in the community.

#### ***Risk of SEA/SH in project areas***

Female labourers are at risk of SEA/SH while participating in construction works. This can include expectations of sexual favours in return for work favours from supervisors, sexual assault, verbal sexual harassment amongst others. SEA/SH may affect female labourers and perpetrators can also include male supervisors, other male labourers and none project workers. The identification of SEA/SH risks during operation will be considered further as part of the GBV Action Plan.

### ***Increased Traffic congestion and Road Accidents***

Increased traffic congestion during construction and poor road safety measures like absence of diversion (where necessary) during construction and road safety awareness campaigns will result into unnecessary road accidents to people especially schoolchildren and old people.

### ***Increased Incidences of Diseases and Ill Health***

The concentration of a large number of people within the proposed project area could contribute to increased levels of communicable diseases, which facilitate the spread of diseases such as Sexually Transmitted Diseases (STDs), HIV/AIDS, Covid 19 and other ailments.

### ***Labour and Working Conditions***

Contracted workers and those employed in the supply chain are at risk of being subjected to poor labour practices by their employers this may include lack of contracts, irregular pay, working long hours, lack of breaks etc. In addition, the use of child labour in the supply chain (e.g., the production of gravel is known to occur in Tanzania and will be avoided. Women are also at risk of being discriminated against in terms of employment opportunities by contractors. There is also a risk of sexual exploitation of women by their employers/contractors which could include demands for sexual activities in exchange for recruitment, keeping their job etc by male supervisors. Due to technological developments and investment in labour saving equipment, the skilled and non-skilled workforce will be needed. The skilled construction workers will be imported to the area of construction and will reside in labour camps. A smaller number of local low-skilled jobs may be envisaged. These will include protection and guarding of the construction companies' properties. Low skilled workers will be hired around the project jurisdiction if necessary. Labour camps will be the responsibility of the contractor under the supervision of the consultant and Mwanza City Council. In order to ensure that the labour camps comply with the national law and ESS4 contractors will be required to prepare camp management plans as well as codes of conduct for workers and compliance will be mandatory for all workers. Other measures for the protection of and operation of the workers camp will be as narrated in ESS2 and subsequent project LMP.

## 6.3.4 Operational Phase Impacts

### ***Positive Social Impacts***

#### ***Benefits to community resulting from employment***

There would also likely be employment availability during the operation phase pertaining to roads maintenance such as grass cutting, cleaning drainage culverts, etc; as well as some clerical / low level supervision jobs. Such employment would contribute to poverty reduction, especially for women.

#### ***Improved Transport and economy of the people***

The proposed roads improvement will facilitate easy transportation within Mwanza City Council as well as increasing communication among the communities along the road. The improved road would be particularly beneficial to passengers and cargoes where journey times shortened. This will have an impact to the enhanced capacity of the marginalized groups to afford education, health and decent housing in the project areas. The improved

roads will boost up the existing informal sector, which is a source of self-employment for mainly women and youth; the roads will ensure increased commuting speed and thereby facilitating the goods exchange in the informal sector. The improved roads expected to expand and improve the informal sector in which the unemployed women and youth will engage themselves to perform various income generating activities.

### ***Reduced traffic congestion***

The improvement of the roads will definitely reduce problem of Traffic congestion in Mwanza City Council. Now most cars use the tarmac roads which are few and this cause congestion especially in the town centre. After the completion of the project the pressure will be distributed to all the roads since a number of double surface dressing/tarmac roads will be more. Reduced traffic congestion has impacts on serving fuel costs and time.

### ***Improved Community Life and Services***

Several social related advantages will accrue from the project. Improved transportation will enable easy delivery of drugs/medicines to health care facilities. The roads will facilitate easy access to health centres, and thus lives of some patients saved. Living standard of local communities along the project are will be enhanced, as they will be able to easily get access to social facilities such as schools, health centres, religious centres etc.

### ***Increased property values***

It is very obvious that improved roads will increase the property values (plots, farms, buildings etc). This will be an advantage to the property owners since the resell value and rent will increase. Also, Mwanza City Council and national income will increase through the property tax. However, the rise of property value will be disadvantage to tenants and investors.

### ***Negative Social Impacts***

#### ***Increased Road Accidents***

Road deaths, injuries and damage to property are most tangible negative impacts on the community environment and may be reduced or increased as a result of road projects. The project roads transverse in residential areas and the effects the road causes on safety in these settlements are dependent on location. Increased traffic and speed driving will result into unnecessary road accidents to people especially schoolchildren and old people. The main causes for accidents are reckless driving, defective vehicles, drunkenness, poor road facilities for the pedestrian, cyclists, and unqualified drivers.

### ***Negative Environmental Impacts***

#### ***Noise and Air Pollution during operation of roads***

Noise will arise from movement of vehicles. Exhaust fumes will mainly come from vehicles in operation. Noise and fumes will have major direct but short-term impacts during the project operation phase. Along the project sites, the adjacent areas are relatively open, without impediment to air movement hence enhance dilution of air pollutants. For areas away from the sites, leafy vegetation should be able to filter out a considerable content of low-level air borne pollutants. Thus, ventilation and vegetation anticipated to lessen the air pollution problem.

### ***Increased Wastes***

It is obvious that operational activities of roads are associated with production of wastes mainly exhaust fumes and littering from motorists. These wastes can either be air, solid or liquid waste. The solid waste include, spoil, rubbles, tree logs, metals, glasses, papers etc while the liquid waste include sewage, oils etc. These wastes if not well handled can change the aesthetic nature of the project area and can even lead to water pollution in case of improper disposal of oils in the river especially in the areas where there are crossings and the river is close to residential and commercial areas.

### ***Soil erosion due to sand mining and brick making along Mirongo River***

During the operation phase people are likely to invade the river by doing activities such as illegal sand mining and brick making as it is common now which negatively impacts the river. Excessive sand mining induces lowering of the river banks resulting to soil erosion which can readily lead to river bank instability and increase the likelihood of a dangerous river bank collapse. When river banks collapse the developments on the sides of the river are likely to be affected too.

## 6.3.5 Significant Impacts during Decommissioning Phase

### ***Positive Impacts***

#### ***Employment opportunities***

Temporary employment opportunities will be created for the demolition of road and river structures. Works may include transporting waste materials and recycling activities of the demolished structures and materials. Stimulation of local economy through truck hiring and selling of recycling materials and re-use.

#### ***Rehabilitation of the environment***

It is envisaged that the road and river will operate for many years but if decommissioning becomes necessary in future, rehabilitation of the project site will be carried out to restore the site to its original status or to a better state than it was after the decommissioning.

### ***Negative Impacts***

#### ***Increased noise and vibrations***

Demobilization activities normally generate a lot of noise and vibrations. Noise and vibrations can arise from vehicles during demolition of temporary structures and transportation of rubbles. During demobilization noise levels are expected to reach 80dBA if not controlled. Most of the deterrent noises shall be confined during the demobilization period only, which is rather a shorter period compared with the lifetime of the proposed project.

### ***Mitigation***

- Use sound construction equipment, with noise sinks;
- Provide machine operators in various sections with significant noise levels with noise protective gear;
- Construction equipment shall be selected, operated and maintained to minimize noise and unnecessary vibrations; and



- Community nearby shall be informed of the works if they will produce noise and vibrations and that they should stay alert and report if any property or person are affected.

### ***Increased dust levels***

Demobilization activities such as demolition of structures, transportation of rubbles and landscaping always involve production of a lot of dust. During demobilization dust levels are expected to be around 0.2 ppm if not well controlled. If not properly controlled, the dust can cause bronchitis to the workers at site and people living/working near the project site.

### ***Mitigation***

- Water sprinkling shall be applied to open earth to reduce dust emission;
- Trucks transporting construction materials shall be covered if the load is dry and prone to dust emissions; and
- Community notification shall be undertaken where appropriate where work is likely to cause dust impact on the public and nearby residents.

### ***Impairment of environmental quality due to mismanagement of solid wastes***

Demobilization activities will generate a lot of rubble, spoil soils and many types of waste. The waste generated need adequate haulage facilities and at the right time. Inadequate management of the waste shall create unsightly condition on site.

### ***Mitigation***

- Wastes arising will be used wherever possible in the reinstatement of the site such as concrete, gravel, and sand. Also, they reused for filling in damaged street roads which are yet to be upgraded and where there is serious soil erosion from floods. Any excess stored material will be disposed on off-site in full accordance with National Environmental Management Council guidance to minimize the risk of pollution and degradation of habitats.
- The contractor shall follow health and safety regulations and best practice guidelines to ensure that risks to personal safety and equipment on site are minimized.

### ***Increased traffic due limited road access***

During demobilization phase, the roads may be inaccessible and cause increased traffic jams in other roads. These will make it hard for the transportation services hence all other economic activities will be affected in the area.

### ***Mitigation***

- The demolition activities will be done mostly at night and in a short period of time to avoid traffic disturbance.
- The contractor will employ enough workers and machines, so that the works are done fast enough to make way for transportation activities and avoid causing economic losses to people.

### ***Occupational health and public safety hazards***

Demolition works will inevitably expose workers and the public to occupational health and public safety risks: in particular, working with heavy equipment, handling and use of tools engender certain risks. The construction workers are also likely to be exposed to risk of

accidents and injuries resulting from accidental falls, falling objects, injuries from hand tools and other equipment. This impact is considered to be negative, long term of high significance.

### ***Mitigation***

- All workers will be sensitized before the exercise begins, on how to control accidents related to the demolition exercise.
- A comprehensive contingency plan will be prepared before demolition begins, on accident response.
- Adherence to safety procedures will be enforced at all stages of the exercise.
- All workers, pursuant to labor laws, shall be accordingly insured against accidents.
- All workers will be provided and instructed to wear protective clothing during demolition, including helmets.
- Demolition work will be limited to daytime only avoid workers accidents due to poor visibility.

## **6.4 Analysis of Alternatives**

### **6.4.1 Overview**

In the ESIA process, it is important to consider different alternatives, or options, which will achieve the project's objectives. It is also important to include a consideration of what would happen without the project – that is the no project alternative. Environmental assessment for each alternative is also carried out, since each alternative is likely to have a different set, or degree, of impacts. In this ESIA consultations with stakeholders and site visits provided basis for identifying alternatives. The following types of alternatives are presented for consideration:

### **6.4.2 No Project Alternative**

The no project alternative entails retaining the current status quo without developing the proposed infrastructures. Adopting this option would mean avoiding most of the negative effects associated with the infrastructure development and missing all the positive benefits such as job creation and increased income to local communities, improved Transport and economy of the people, improved community life and services, reduced traffic congestion, Increased property values of Mwanza City Council.

### **6.4.3 Alternatives Sites**

There are many roads in Mwanza City Council which are in poor conditions than the selected project roads and other parts of Mirongo river that require rehabilitation. However due to limited resources these roads and the river part were selected due to their impacts to the community. It was observed by that this is the priority for now in order to improve economic development as well as to curb traffic and flood issues Mwanza City Council area.

### **6.4.4 Change alignment**

An alternative to realign the road was considered. This entails diverging from the existing alignment to prevent the destruction of properties. The costs involved in compensation and biological destruction would be extremely very high. However, minor realignment is

expected to improve the geometric layout of the road and river hence avoid extreme compensation.

#### 6.4.5 Alternative design

The use of other pavement materials for pavement construction instead of asphalt concrete was considered. Other materials that was considered includes bricks and concrete. However Asphalt concrete was selected because it offers the following advantages over othe pavement materials;

**-Durability:** Asphalt Concrete is a flexible pavement, with some bridging action, which allows it to withstand occasional overloads without serious damage. Its resistance to freeze-thaw and deicing salts allows it to wear better during winter. Its lack of repetitive joints removes the possibility of blowups that plague Portland Cement Concrete during summer. Inch for inch, asphalt cement concrete performs better than Portland Cement Concrete.

**-Economical:** Research have shown that a dollar spent on asphalt pavements goes 26.9 percent farther than a dollar spent on concrete pavements. That is because asphalt is cost-effective. It has a lower first cost than concrete and it lasts longer. Staged construction helps spread out the cost of placement. Because asphalt pavement has no joints to repair and is not affected by freezethaw actions, it is much less expensive to maintain.

**-Safety:** Asphalt pavements offer high skid resistance values. The dark color of asphalt reduces glare and provides a high contrast for lane markings.

**-Ease of Construction:** Asphalt Concrete is machine-placed, removing the need for time-consuming form work and steel reinforcement. Traffic can use the pavement almost immediately, no delay is required to allow the pavement to cure. The lack of pavement joints reduces maintenance requirements. Repair of an asphalt surface is quick and easy, because there is little downtime waiting for a patch to cure.

**-Staged Construction:** A major advantage for Asphalt Concrete is the potential for staged construction. The asphalt base course can be placed and used under traffic during initial construction. This pavement can then be overlaid with final surface courses. Staged construction improves on-site conditions, removes the aspect of muddy soils, and provides a place to store construction materials and equipment. This method also provides an opportunity to discover and correct unanticipated problem areas, such as a weak subgrade, poor drainage, or poorly compacted trenches, which can be repaired at minimal cost.

**-Recyclable:** Another major advantage of Asphalt Concrete is its ability to be completely recycled. Not only can the aggregates be reused, but the asphalt cement binder also retains its cementing properties and can be reused in a new mix. Pavements can be recycled both on site using cold mix or via a hot mix plant. Recycled pavements have been tested and proven in both the laboratory and the field to perform at least as well as virgin aggregate mixes. Asphalt pavements are 100 percent recyclable.

**Storm water drains:** In this project, covered storm water channels shall be constructed instead of open drains. Both options were considered but the covered drains option was selected because it offers the following advantages;

- Prevent solid waste from entering the channel and reduce the carrying capacity
- The risk of accidents that can be caused when people (especially children) fall into the channel taking into consideration the project is located in unplanned area
- Can be used as walkway and therefore serve the space that could have been taken for walkways for the case of open channel. This in turn reduces compensation costs.

### 6.3.6 Energy Alternative

The use of other alternative energy sources apart from power from the national grid and diesel generators were considered. It is generally acceptable that the supply of electricity from national grid is not reliable as it mostly originates from hydroelectric power generators, which depend on rainfall frequency, intensity and pattern. On the other hand, diesel generators, which are mainly used during power interruptions, emit a lot of greenhouse gases especially when they are run for a long time. Solar energy was considered and the design team shall explore the feasibility of using this alternative.

### 6.3.7 Construction Materials and Technology

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that saves energy and water will be given first priority without compromising on cost or availability factors. The concrete roads and river infrastructure will be made using locally sourced stones, cement, sand, steel metal bars and fittings that meet the Tanzania Bureau of Standards requirements. The technology to be adopted will be the most economical and one sensitive to the environment.

### 6.3.8 Water Sources Alternative

The water source for the proposed project is Lake Victoria. This option was chosen because Lake Victoria is capable of providing the amount of water that will be required for the proposed construction activities. Alternatively, water from rivers around the project areas such as Mirongo and MWAUWASA would be used but because of the needs of the project's construction activities, so much pressure will be put in those sources and it will be a waste of portable water too. Therefore, using water from Lake Victoria for the project activities will be a better choice for the proposed project.

## 6.5 Impacts Mitigation Measures

### 6.5.1 General Considerations for Meeting the Requirements of the WB ESS

This chapter is also devoted to describing measures or actions that shall be implemented so as to minimize or enhance any of the potential impacts identified in the preceding chapter. Many of the mitigation measures put forward are more of good engineering practice that shall be adhered to during the design and construction phases. The Mwanza City Council is committed to the implementation of mitigation measures contained in this report.

The mitigation measures are designed to ensure that they are applicable and therefore can easily be reflected in the ESMP as described in Chapter Seven of this ESIA report, but also as the requirement for meeting the WB ESS as narrated in **Table 14** of the TACTIC ESMF. The table provides guidance on what the project should do to meet the requirements of the WB ESS.

### 6.5.2 Mitigation Measures for Impacts During Construction and Operational Phases

#### *Destruction of Public Utilities*

-The authorities managing these infrastructures (TRL/SGR, TANESCO, TTCL and MWAUWASA should be involved from the early stages of this project have an integrated planning.

-Early notice should be given to the community before to avoid any service interruption

-The funds for the relocation of this infrastructure should be part and parcel of the project.

### ***Soil Erosion and Instability of Slopes***

- Unnecessary ground clearance and sensitive re-alignments shall be avoided.
- Lined drainage channels at sensitive terrains shall be provided to control speed and volumes of storm-water. The discharge points shall be carefully chosen to avoid erosion of arable land and creation of gullies.
- The contractor should plant grass or any other vegetation cover to minimise exposed soil surface.
- Proper grading to promote sheet flow and minimize flow concentration on unconsolidated soil.
- Directing flow to properly designated channels.

### ***Increased water and soil pollution***

- Refueling of plant or transfer of materials should not be carried out near water bodies, and any local spillage to soil should immediately be remedied.
- Good house keeping shall be practiced within material storage compounds or vehicle maintenance yards where the possibility of spillage is great. This can easily be done by provision of Spill tanks and Secondary containment at vehicle maintenance yards.
- The contractor should Plant vertiver grasses to minimize exposed soil surface area where necessary
- The use of silt fences and hay bales to remove suspended solids from surface water runoff
- Silt curtains should be used to minimize sediment suspension and transport while working near water crossings.

### ***Noise, Vibration and Air***

- The nuisance of noise, vibration and dust will be transient and good work practice shall minimize them. In addition, these impacts experienced due to the existing road segments.
- The impacts of noise and dust emissions will further be minimized by proper choice of plant and machinery (i.e., fitted with noise and dust silencers or reducers) and locating quarry areas away from human habitations (at least 500 m away).
- Dust at work places within or close to human habitation critically minimized by periodic water sprinkling on working sections. The contractor shall advise or notify local households on dust, noise, vibration and other dangers.
- Watering shall be practiced regularly at all active work sections especially along the road and at all quarries and borrow sites for the protection of workers.

### ***Safety and Health Risks***

- Appropriate working gear (such as nose, ear mask and clothing) and good camp management provided.
- During construction, the contractor shall ensure that the campsite is fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, firefighting and clean and safe water supply. A health and safety management plan attached as **Appendix V** should be followed.
- A well-stocked First Aid kit (administered by first aider) maintained at the camp and each active work section.
- The medical personnel/First Aider shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing some health education to the workforce.

### ***Increased Road Accidents***

- The designs shall take account of safety concerns especially at human habitation crossings e.g., installation of bus stops at settlement centres.
- Awareness seminars shall be conducted during the construction and operation phases
- Traffic management plan shall be incorporated in the designs to include for example details of signs, markings, intersection layouts, access restrictions, bus stops, crossings, footpaths etc.
- The traffic management plans presented both in English and in Swahili.
- Installation of speed control devices like humps
- All drivers (Contractor's) instructed to follow the minimum speed of 20 KPH at the work sites.
- Adequate signboards will be placed at the relevant location and flag man will be assigned whenever necessary.

### ***Labour and working Conditions***

- The project will develop Labour Management Procedures to guide the employment of all workers.
- Contractors will be required as part of the bidding documents to develop camp management plans and codes of conduct for workers,
- The contractor shall be encouraged to employ local, unemployed yet willing to work hard, manpower to the extent viable subject to a maximum of 50% unskilled labour. This will ensure that local people are more benefited out of the project;
- All workers will have contracts with terms and conditions that are consistent with national labour laws and policies as well as ESS2.
- Workers will have access to a specific worker grievance mechanism in line with ESS2, which will be documented in the LMP.
- Contractors will be required to apply equal opportunities/ non-discrimination to the employment of workers and not discriminate on the basis of gender or any other personal characteristics.
- Contractors will be required to ensure that no children are employed on the site and have in place measures to verify the age of workers. Child under 14 are prohibited from working while children aged 14-18 can only take on light work (which generally excludes work on construction sites).
- All workers must have an employment contract, be paid for their work and have the right to resign if they wish. Forced labour will be explicitly prohibited.
- Selection of companies in the supply chain will involve due diligence to avoid the use of companies which are involved in child labour.
- The project will develop a GBV Action Plan which will include prevention and response measures. This will include codes of conduct, training and capacity building, awareness raising, access to referral pathways etc.

### ***Increased Incidences of Diseases and ill Health***

- A safety, health and environment induction course shall be conducted to all workers, putting more emphasis on HIV/AIDS, which has become a national disaster;
- The project shall include information education and communication component (IEC) in its budget. This will help to raise more awareness on HIV/AIDS, and means to suppress its incidence;
- Environmental sanitation systems shall be improved; and
- Medical facilities shall be increased at dispensary close to project areas so as to meet the population demand.

-Follow all measures outlined to prevent spread of Covid 19 such as leaving a minimum distance of 1m between workers, washing of hands while entering and leaving the site, wearing of masks, and provision of facilities for frequent check up to reduce new cases. Hand washing facilities will be provided at site

### ***Risk of SEA/SH in project areas***

-A GBV Action Plan will be drafted, approved and implemented which will include the following:

-Assess the SEA/SH risks associated with the project based on existing data and input from key stakeholders. This will include identification of risks to workers and communities during construction.

-Map out GBV prevention and response actors at the project level, and the City levels.

-Define the GBV requirements and expectations in the bid documents including codes of conducts (to be signed by workers), training, awareness raising for workers and the community, GBV responsive GRMs and approach to GBV case management.

-Define the GBV measures needed to protect female workers and communities surrounding project areas including the need for Mwanza City Council to develop GBV policies to address SEA/SH, training and awareness raising, GBV responsive GRMs, educator/ staff codes of conduct (to be signed), referral pathways etc.

### ***Increased Waste Generation***

-Adequate number of waste bins shall be provided at the construction sites

-Only inert materials or readily decomposable materials shall be disposed by burial.

-No burning of waste materials which produces black smoke shall be approved. Plastics shall not be burned.

-No open burning of oils shall be done

-The construction sites shall have adequate toilets with septic tank-soak away treatment system

### ***Loss of Vegetation***

-Close supervision of earthworks shall be observed in order to confine land clearance within the proposed new corridor of impact boundaries.

-Topsoil shall be stockpiled and used for reinstating flora along the road. It is assumed that displaced fauna will return once the work is over, or seek another habitat locally.

-The road design shall try as practicable to offset the route so as to avoid felling all big trees that take many years to grow or other flora of outstanding importance.

### ***Increased Road Accidents***

-Capacity building of police (traffic) offices

-Installation of proper road signs and regular inspections for their presence

-Installation of speed control devices like humps

-Installation of pedestrian lanes at human settlement crossings

### ***Soil erosion due to sand mining and brick making***

- Building strong protection and planting trees along the river banks to ensure that effects against soil erosion are avoided.

- Sustainable sources of construction-grade sand must be sought. These sources must be passive so the extraction does not damage rivers. An example is the newly-available sand from the retreating ice-sheet in Greenland. An inventory of the available sediment resources

through sand auditing should be made prior to sanction of leases. The distance between river mining sites should depend on the width and replenishment rate of the river.

-Governmental guidelines on where and when sand extraction is and is not sustainable are needed as well as a national framework to regulate and control sand mining activities. Safety zones should be marked when mining in the proximity of infrastructure such as bridges or embankment. Mining should be done during periods of lowest biological activity and authorities should be attentive to spawning seasons and condition.

- A monitoring program to find and keep track of sediment mining is mandatory. This can be realized with the help of remote sensing. It is even possible to remotely track the sediment discharge rates of rivers and thus monitor the natural variations of sand flux in the river. A pre- and post-mining baseline survey as well as monitoring of mining activities should be incorporated in policy guidelines. Periodic biota surveys should be conducted before, during and after mining operations.



## **CHAPTER SEVEN**

### **ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN**

#### **7.1 Introduction**

The Environmental and Social Management Plan (ESMP) presents the implementation schedule for the proposed mitigation measures to both environmental and social impacts as well as planning for long-term monitoring activities. The ESMP also includes the associated environmental costs needed to implement the recommended mitigation measures. The engineering designs have already included some of the mitigation measures recommended in this report. Additional recommendations provided in the ESMP to enable the proposed facilities become more environmentally friendly. The implementation steps will involve the Contractor, the Resident Engineer, some utilities provide such as MWAUWASA, TTCL and TANESCO, and the local communities at large. The ESMP is also designed in a way to meet the requirement of the World Bank Environmental and Social Standards (WB ESS) as narrated in Table 14 of the TACTIC ESMF. **Table 33** provides the ESMP for the proposed upgrading of Igoma – Buhongwa road and the Mirongo river.

#### **7.2 Environmental and Social Costs**

The principal environmental and social cost includes the cost for implementing the mitigation measures proposed and that for carrying out monitoring of specific environmental and social parameters. These costs indicated in **Table 33**. It noted that most of the costs for mitigation measures are included in the bills of quantities of the overall works. The costs for the environmental and social supervisor shall be included in the overall supervision cost of the works.

Table 37: Environmental and Social Management Plan (ESMP) for the Proposed upgrading of Igoma-Kishiri-Buhongwa Road in Mwanza City

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs in TSH
Construction phase					
Destruction of other infrastructures	<p>-TANESCO, MWAUWASA, TRL/SGR and TTCL shall be involved from the early stages of these projects so as to have an integrated planning.</p> <p>-Early notice shall be given to the community before any service interruption</p> <p>-The funds for the relocation of this infrastructure shall be part and parcel of the project.</p>	Mwanza City Council	Design and Construction		Provided in the BoQ (Series 1000)
Soil Erosion and instability of Slopes	<p>-Unnecessary ground clearance and sensitive re-alignments shall be avoided.</p> <p>-Lined drainage channels at sensitive terrains shall be provided to control speed and volumes of storm-water. The discharge points must be carefully chosen to avoid erosion of arable land and creation of gullies.</p> <p>-The contractor should Plant vertiver grasses to minimise exposed soil surface.</p> <p>-Proper grading to promote sheet flow and minimize flow concentration on unconsolidated soil.</p> <p>-Directing flow to properly designated channels.</p>	Mwanza City Council	During Design and Construction	Provided in the BoQ (SS 1704)	
Noise pollution	<p>-Provide working gear to workers</p> <p>-All noisy works shall be restricted during day time only</p> <p>-Proper choice of equipment which offer environmental advantages</p>	Mwanza City Council	Construction	Provided in the BoQ (SS 1709)	

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs in TSH
Air pollution	-Watering road section (near human habitation) -Proper choice of equipment which offer environmental advantages	Mwanza City Council	Construction	Provided in the BoQ (SS 1708)	
Vibration	-Advance notice to local communities	Mwanza City Council	Construction		
Safety and health risks to workers and local communities	-Appropriate working gear (such as nose, ear mask and clothing) and good camp management shall be provided to the construction workers. -A well-stocked First Aid kit (administered by medical personnel) shall be maintained at each camp, quarry sites and each active work section along the road. - All schools located along the proposed road should be well fenced. -All dredged materials from the river should be loaded to the trucks for safe disposal at the designated dumping site at Buhongwa area. -Strictly follow Health and Safety Management Plan as described in <b>Appendix V</b> of this ESIA.	Mwanza City Council	Construction Phase	Provided in the BoQ	
Increased Accidents	-Contractor shall prepare Traffic Management plan which shall be approved by the Engineer and the -A transport coordinator shall be appointed to control the movement of vehicles and equipment and he shall be responsible for safe and smooth deployment of fleet. -All drivers and operators shall possess a valid Tanzania license for the types of vehicles being driven or machinery operated. -An in-house training on defensive driving	Mwanza City Council	Design stage and Construction Phase		

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs in TSH
	<p>techniques and safe tipping operation shall be imparted to all drivers before allotting vehicles to them.</p> <p>-Over speeding shall not be allowed at any case and if observed do so disciplinary actions shall be taken against the defaulter. Maximum speed shall be limited to 40km/hr.</p> <p>-Nobody is allowed to drive if under the influence of alcohol or drugs.</p> <p>-Beware signage shall be established on public institutions' entrances</p>				
Increased Waste	<p>-Vegetations (Trees, Grasses) and remnants of timber shall be given to residents near the project roads to be used as Source of energy.</p> <p>-Food remains, cardboards and papers (Degradable waste) shall be collected in a large skip bucket at the campsite then to be composted and used as manure for the gardens at the camp site/office</p> <p>-Top soil shall be used as backfilling material in the borrow pits, fill the diversions.</p> <p>-Plastics and Scrap Metals shall be sold to certified recyclers</p> <p>-Tins Glasses and other inert materials Taken to the Authorized dumpsite</p> <p>-Sewage shall be directed Septic tank –Soak away system at the camp site/office and mobile toilets along the route.</p>	Mwanza City Council	Construction Phase	Provided in the BoQ (SS1712)	
Loss of Scenic Quality	-The topsoil shall be stock piled for later use in reinstating the pit.	Mwanza City Council	During Mobilization,	Provided in the BoQ (SS 1703)	

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs in TSH
	-Sand and Gravel shall be sourced from the approved Sand mines and Quarries (Which have mining license)		Construction and after construction		
Loss of Vegetation	<p>-Close supervision of earthworks shall be observed in order to confine land clearance within the proposed new corridor of impact boundaries.</p> <p>-The contractor shall replant trees and grasses along the roads where possible.</p> <p>-Topsoil shall be stockpiled and used for reinstating flora along the road. It is assumed that displaced fauna will return once the work is over, or seek another habitat locally.</p> <p>-The road design shall try as practicable to offset the route so as to avoid felling all big trees that take many years to grow or other flora of outstanding importance.</p> <p>-Trees and Crops to be removed shall be compensated</p>	Mwanza City Council	During Construction	Provided in the BoQ (SS1705 and SS5700)	
Operation phase					
Interference to local hydrology	<p>-The design shall utilize as much as possible the existing channels.</p> <p>-Where possible, the designs shall leave enough unpaved space alongside the road for water to seep into the ground.</p> <p>-The design will provide controlled and effective storm water dispersion by installation of adequate and appropriate drainage structures.</p> <p>-The discharge points shall be well designed to avoid</p>	Mwanza City Council	Design Stage	N/A	

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs in TSH
	accelerate erosion downstream.				
Increased Road accidents	<p>-In order to prevent accidents, during the operational phase, the project should include information education and communication component (IEC) in its budget. This will help to raise more awareness on road safety issues.</p> <p>-Capacity building of polices (traffic) offices</p> <p>-Installation of proper road signs (in Swahili Language) and regular inspections for their presence</p> <p>-Installation of speed control devices like humps</p> <p>-Installation of pedestrian lanes at human settlement crossings</p>	Mwanza Council	City Operation phase		
Decommissioning phase					
Increased noise and vibrations	<p>-Use sound construction equipment, with noise sinks;</p> <p>-Provide machine operators in various sections with significant noise levels with noise protective gear;</p> <p>-Construction equipment shall be selected, operated and maintained to minimize noise and unnecessary vibrations; and</p> <p>-Community nearby shall be informed of the works if they will produce noise and vibrations and that they should stay alert and report if any property or person are affected.</p>	Mwanza Council	City		
Increased dust levels	<p>-Water sprinkling shall be applied to open earth to reduce dust emission;</p> <p>-Trucks transporting construction materials shall be covered if the load is dry and prone to dust</p>	Mwanza Council	City		

<b>Impact</b>	<b>Mitigation measure</b>	<b>Responsible institution/Individuals</b>	<b>Mitigation Time frame</b>	<b>Annual Costs</b>	<b>Lump sum (Onetime costs) Costs in TSH</b>
	emissions; and -Community notification shall be undertaken where appropriate where work is likely to cause dust impact on the public and nearby residents.				
Impairment of environmental quality due to mismanagement of solid wastes	-Wastes arising will be used wherever possible in the reinstatement of the site such as concrete, gravel, and sand. Also, they reused for filling in damaged street roads which are yet to be upgraded and where there is serious soil erosion from floods. Any excess stored material will be disposed on off-site in full accordance with National Environmental Management Council guidance to minimize the risk of pollution and degradation of habitats. -The contractor shall follow health and safety regulations and best practice guidelines to ensure that risks to personal safety and equipment on site are minimized.	Mwanza City Council			
Increased traffic due limited road access	-The demolition activities will be done mostly at night and in a short period of time to avoid traffic disturbance. -The contractor will employ enough workers and machines, so that the works are done fast enough to make way for transportation activities and avoid causing economic losses to people.	Mwanza City Council			
<b>Total Cost</b>					<b>155,000,000</b>

Table 34: Environmental and Social Management Plan (ESMP) for the Proposed upgrading of the Mirongo river in Mwanza City

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs in TSH
Construction phase					
Destruction of other infrastructures	<p>-MWAUWASA, some bridges and crossings shall be involved from the early stages of these projects so as to have an integrated planning.</p> <p>-Early notice shall be given to the community before any service interruption</p> <p>-The funds for the relocation of this infrastructure shall be part and parcel of the project.</p>	Mwanza City Council	Design and Construction		Provided in the BoQ (Series 1000)
Soil Erosion and instability of Slopes	<p>-Unnecessary ground clearance and sensitive re-alignments shall be avoided.</p> <p>-Lined drainage channels at sensitive terrains shall be provided to control speed and volumes of storm-water. The discharge points must be carefully chosen to avoid erosion of arable land and creation of gullies.</p> <p>-The contractor should Plant vertiver grasses to minimise exposed soil surface.</p> <p>-Proper grading to promote sheet flow and minimize flow concentration on unconsolidated soil.</p> <p>-Directing flow to properly designated channels.</p>	Mwanza City Council	During Design and Construction	Provided in the BoQ (SS 1704)	
Noise pollution	<p>-Provide working gear to workers</p> <p>-All noisy works shall be restricted during day time only</p> <p>-Proper choice of equipment which offer environmental advantages</p>	Mwanza City Council	Construction	Provided in the BoQ (SS 1709)	



Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs in TSH
Air pollution	-Watering where necessary to reduce dust and other air pollutants from project activities (near human habitation) -Proper choice of equipment which offer environmental advantages	Mwanza City Council	Construction	Provided in the BoQ (SS 1708)	
Vibration	-Advance notice to local communities	Mwanza City Council	Construction		
Safety and health risks to workers and local communities	-Appropriate working gear (such as nose, ear mask and clothing) and good camp management shall be provided to the construction workers. -A well-stocked First Aid kit (administered by medical personnel) shall be maintained at each camp, quarry sites and each active work section along the road. - All schools located along the proposed road should be well fenced. -All dredged materials from the river should be loaded to the trucks for safe disposal at the designated dumping site at Buhongwa area. -Strictly follow Health and Safety Management Plan as described in <b>Appendix V</b> of this ESIA.	Mwanza City Council	Construction Phase	Provided in the BoQ	
Increased Accidents	-Contractor shall prepare Traffic Management plan which shall be approved by the Engineer -A transport coordinator shall be appointed to control the movement of vehicles and equipment and he shall be responsible for safe and smooth deployment of fleet. -All drivers and operators shall possess a valid Tanzania license for the types of vehicles being	Mwanza City Council	Design stage and Construction Phase		

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs in TSH
	<p>driven or machinery operated.</p> <p>-An in-house training on defensive driving techniques and safe tipping operation shall be imparted to all drivers before allotting vehicles to them.</p> <p>-Over speeding shall not be allowed at any case and if observed do so disciplinary actions shall be taken against the defaulter. Maximum speed shall be limited to 40km/hr.</p> <p>-Nobody is allowed to drive if under the influence of alcohol or drugs.</p> <p>-Beware signage shall be established on public institutions' entrances</p>				
Increased Waste	<p>-Vegetations (Trees, Grasses) and remnants of timber shall be given to residents near the project roads to be used as Source of energy.</p> <p>-Food remains, cardboards and papers (Degradable waste) shall be collected in a large skip bucket at the campsite then to be composted and used as manure for the gardens at the camp site/office</p> <p>-Top soil shall be used as backfilling material in the borrow pits, fill the diversions.</p> <p>-Plastics and Scrap Metals shall be sold to certified recyclers</p> <p>-Tins Glasses and other inert materials Taken to the Authorized dumpsite</p> <p>-Sewage shall be directed to Septic tank –Soak away system at the camp site/office and mobile toilets along the route.</p>	Mwanza City Council	Construction Phase	Provided in the BoQ (SS1712)	

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs in TSH
Loss of Scenic Quality	<ul style="list-style-type: none"> <li>-The soil from river dredging shall be stock piled for later use in reinstating the pits.</li> <li>-Sand and Gravel shall be sourced from the approved Sand mines and Quarries (Which have mining license)</li> </ul>	Mwanza City Council	During Mobilization, Construction and after construction	Provided in the BoQ (SS 1703)	
Loss of Vegetation	<ul style="list-style-type: none"> <li>-Close supervision of earthworks shall be observed in order to confine land clearance within the proposed new corridor of impact boundaries.</li> <li>-The contractor shall replant trees and grasses along the river where possible.</li> <li>-Topsoil shall be stockpiled and used for reinstating flora along the river. It is assumed that displaced fauna will return once the work is over, or seek another habitat locally.</li> <li>-The river design shall try as practicable to offset the route so as to avoid felling all big trees that take many years to grow or other flora of outstanding importance in protecting the river.</li> </ul>	Mwanza City Council	During Construction	Provided in the BoQ (SS1705 and SS5700)	
<b>Operation phase</b>					
Interference to local hydrology	<ul style="list-style-type: none"> <li>-The design shall utilize as much as possible the existing channels.</li> <li>-The design will take into consideration the stormwater coming from drains along the river.</li> <li>-The discharge points shall be well designed to avoid accelerate erosion downstream.</li> </ul>	Mwanza City Council	Design Stage	N/A	
Siltation	<ul style="list-style-type: none"> <li>- There will be removal of soil due to erosion and floods that carry it the river and makes it lose its cause/ flood.</li> </ul>	Mwanza City Council	Operation phase		

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs in TSH
Soil erosion due to sand mining and brick making along Mirongo River	<ul style="list-style-type: none"> <li>- Building strong protection and planting trees along the river banks to ensure that effects against soil erosion are avoided.</li> <li>- Sustainable sources of construction-grade sand must be sought. These sources must be passive so the extraction does not damage rivers. An example is the newly-available sand from the retreating ice-sheet in Greenland. An inventory of the available sediment resources through sand auditing should be made prior to sanction of leases. The distance between river mining sites should depend on the width and replenishment rate of the river.</li> <li>-Governmental guidelines on where and when sand extraction is and is not sustainable are needed as well as a national framework to regulate and control sand mining activities. Safety zones should be marked when mining in the proximity of infrastructure such as bridges or embankment. Mining should be done during periods of lowest biological activity and authorities should be attentive to spawning seasons and condition.</li> <li>- A monitoring program to find and keep track of sediment mining is mandatory. This can be realized with the help of remote sensing. It is even possible to remotely track the sediment discharge rates of rivers and thus monitor the natural variations of sand flux in the river. A pre- and post-mining baseline survey as well as monitoring of mining activities should be incorporated in policy guidelines. Periodic biota</li> </ul>	Mwanza City Council	Operation phase		

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs in TSH
	surveys should be conducted before, during and after mining operations.				
Decommissioning phase					
Increased noise and vibrations	<ul style="list-style-type: none"> <li>-Use sound construction equipment, with noise sinks;</li> <li>-Provide machine operators in various sections with significant noise levels with noise protective gear;</li> <li>-Construction equipment shall be selected, operated and maintained to minimize noise and unnecessary vibrations; and</li> <li>-Community nearby shall be informed of the works if they will produce noise and vibrations and that they should stay alert and report if any property or person are affected.</li> </ul>	Mwanza Council	City	Decommissioning phase	
Increased dust levels	<ul style="list-style-type: none"> <li>-Water sprinkling shall be applied to open earth to reduce dust emission;</li> <li>-Trucks transporting construction materials shall be covered if the load is dry and prone to dust emissions; and</li> <li>-Community notification shall be undertaken where appropriate where work is likely to cause dust impact on the public and nearby residents.</li> </ul>	Mwanza Council	City	Decommissioning phase	
Impairment of environmental quality due to mismanagement of solid wastes	-Wastes arising will be used wherever possible in the reinstatement of the site such as concrete, gravel, and sand. Also, they reused for filling in damaged street roads which are yet to be upgraded and where there is serious soil erosion from floods. Any excess stored material will be disposed on off-site in full	Mwanza Council	City	Decommissioning phase	

<b>Impact</b>	<b>Mitigation measure</b>	<b>Responsible institution/Individuals</b>	<b>Mitigation Time frame</b>	<b>Annual Costs</b>	<b>Lump sum (Onetime costs) Costs in TSH</b>
	accordance with National Environmental Management Council guidance to minimize the risk of pollution and degradation of habitats. -The contractor shall follow health and safety regulations and best practice guidelines to ensure that risks to personal safety and equipment on site are minimized.				
Increased traffic due limited road access	-The demolition activities will be done mostly at night and in a short period of time to avoid traffic disturbance. -The contractor will employ enough workers and machines, so that the works are done fast enough to make way for transportation activities and avoid causing economic losses to people.	Mwanza City Council	Decommissioning phase		
<b>Total Cost</b>					<b>120,000,000</b>

### **7.3 Institutional Arrangements and Reporting Procedures**

Mwanza City Council assisted by environment specialists, will be responsible for reviewing civil works contracts in accordance with the ESIA report; coordinating the implementation of the ESMP among the contractors, local environmental authorities (e.g., Ward Development Committees; monitoring the implementation of the ESMP and the civil works contracts in collaboration with NEMC and, preparing annually environmental progress reports. The purpose of environmental and social monitoring is to quantitatively measure the environmental effects of the road project. The environmental monitoring program will operate through the preconstruction, construction, and operation phases. It will consist of a number of activities, each with a specific purpose, key indicators, and significance criteria.

The monitoring of mitigation measures during design and construction will be carried out by a Contractor's Environmental manager and Engineer's Environmental and Social Specialist. They will conduct mitigation monitoring as part of the regular works inspections. The weekly inspection will be undertaken by the Contractor's Environmental Manager. When available and appropriate the inspection will also be attended by Engineer's Environmental and Social Specialist, the main Contractors site management staff and their specialist advisors. A weekly Environmental Compliance Report will be produced following each inspection and will incorporate any actions identified during any inspections. The inspection report will summarize the status of the site's compliance, and include photographic records if appropriate. The reports will cover, among other matters as appropriate, the following:

- Contractor's compliance with mitigation measures
- Wastewater and environmental sanitation issues
- Traffic congestion or disruption
- Performance of the water supply systems
- Potential project-related risks and risk management issues
- Quality of water in streams crossing the project roads
- Status of measures to assist project-affected people at the new resettlement sites on environmental aspects
- Consultation with local communities in key project areas

The responsibility for mitigation monitoring during the operation phase will lie with the Environmental Section in Mwanza City Council. Mwanza City Council will provide NEMC with reports on environmental compliance during implementation as part of their annual progress reports and annual environmental monitoring reports. Depending on the implementation status of environmentally sensitive areas of the project, NEMC will perform annual environmental reviews in which environmental concerns raised by the project will be reviewed alongside project implementation.

### **7.4 Capacity Building Program**

Mwanza City Council have one Environmental Officer under the Department of Land and Natural resource. It proposed to provide capacity building through technical assistance that will support Mwanza City Council during the implementation of the ESMP. The technical assistance will provide the necessary support to Mwanza City Council in its work with contractors as well as other entities involved in the implementation of the EMP.

The technical assistance will include support to experts and training that will cover (i) general knowledge of safeguards requirements and project procedures, and (ii) important specific knowledge in safeguard procedures and requirements for project staff, consultants, and national contractors. This will include, for example, assistance with the preparation of documents and implementation of training programs on environmental management and environmental monitoring for contractors and relevant staff of Mwanza City Council to do their tasks. It will also include assisting Mwanza City Council environmental and social staff with the review of contract documents to ensure compliance with the EMP. It will also provide general environmental guidance as requested by Mwanza City Council to enhance overall project implementation and performance.

Given the nature, locations, and scale of construction, it is anticipated that the safeguard technical assistance support and training will be provided at least during the first 3 years of the project implementation.

#### 7.4.1 Proposed Training Programs

The **Table 34** provides examples of the basic training programs for safeguards during project implementation. The training programs developed and delivered by the Technical Assistance team for the implementation of safeguards for the Mwanza City Council training. The Mwanza City Council trained staff with the support of the Technical Assistance team for the implementation of safeguards will provide the training to contractors and other entities concerned.

Other more specific and tailored training will be developed and agreed upon between Mwanza City Council and the Technical Assistance team for the implementation of safeguards during project implementation based upon a reassessment of needs and the status of safeguards implementation.

*-Target groups for the training:* Mwanza City Council Staff, Contractors and community representatives in the project area.

*-Training schedule:* at least 1 month before the construction of the first contract. The training adjusted in line with the implementation schedule of the subproject/contracts.

*-Training frequency:* The basic training programs proposed in table below will take place every six months on a yearly basis and its content updated and adapted to implementation issues. Training frequency and content reassessed during implementation depending on needs. It foreseen that the training program for Mwanza City Council staff will continue until year-end of construction period. Three days of training for contractors planned to take place twice a year on an annual basis for at least two years.

Table 35: Training Programs for Capacity Building in Environmental Supervision and Management

<b>Target Group</b>	<b>Mwanza City Council Staff</b>
Course Title	Environmental supervision, monitoring and reporting
Participants	Environmental staff and technical staff (Project Coordinator, 20 Mwanza City Council staff, 2 NEMC Staff, 2 Division of Environment Staff)
Training Frequency	Soon after project effectiveness but at least 1 month before start of construction of the first contract. Follow-up training will be scheduled as needed.
Time	Four days of training, to be held twice a year, and then to be repeated on



Content	<p>a yearly basis until year three of implementation.</p> <ul style="list-style-type: none"> <li>-General environmental management relating to the project, and covering the requirements</li> <li>-General aspects of environmental supervision;</li> <li>-Implementation and supervision of mitigation measures;</li> <li>-Community participation in environmental supervision monitoring.</li> <li>-Guidance and supervision of contractors, Subcontractors and community representatives in the implementation of environmental supervision.</li> <li>-Use of forms for environmental supervision;</li> <li>-Risk response and control;</li> <li>-Receipt and submission of reporting forms</li> <li>-Other areas of training needs, as determined</li> </ul>
Responsibilities	Mwanza City Council with support of the Technical Assistance team for the implementation of safeguards.
<b>Target Groups</b>	<b>Contractors, Subcontractors, Wards Authorities, Community Representatives</b>
Course Title	Implementation of mitigation measures
Participators	On-site construction management staff; environmental staff of contractors; ward/group authorities.
Training frequency	After bidding, and determine based on needs
Time	3 days of training for contractors and 2 days of training for others, to be repeated twice a year on an annual basis depending on needs
Content	<p>Overview of environmental monitoring;</p> <p>Requirements of environmental monitoring;</p> <p>Role and responsibilities of contractors</p> <p>Scope and methods of environmental monitoring;</p> <p>Response and risk control;</p> <p>Propagate monitoring forms and guide how to fill in the forms and risk report;</p> <p>Preparation and submission of reports</p> <p>Other areas to be determined.</p>
Responsibilities	Mwanza City Council with support of the Technical Assistance team for the implementation of safeguards
<b>Target Groups</b>	<b>Communities and Workers</b>
Course Title	Environmental sanitation and safety
Participators	Representatives of community and/or worker leaders (as appropriate)
Training frequency	As appropriate
Time	One-day presentation and one-day on-the job training twice a year, to be repeated on as needed basis

Content	<ul style="list-style-type: none"> <li>-Detailed presentation on environmental protection and environmental overview</li> <li>-Key issues that require communities' and workers' attention to minimize safety risks (roads, waterways, equipment, machines, open excavations, etc.) as well as reduce pollution (dust, fumes, gases, oil/grease spills, waste management, etc.)</li> <li>-Management of environmental safety and sanitation on work sites;</li> <li>-Mitigation measures at construction sites;</li> <li>-Safety measures on electricity, mechanical, transportation, air pollution;</li> <li>-Procedures to deal with emergency situations;</li> <li>-Other areas to be determined.</li> </ul>
Responsibilities	Contractor and Mwanza City Council

## CHAPTER EIGHT

### ENVIRONMENTAL AND SOCIAL MONITORING PLAN

#### 8.1 Environmental and Social Monitoring

Monitoring of the anticipated environmental and social impacts in the receiving environments is important. It helps in determining the effects of the project activities on the environments enhancing understanding of cause effect relationships between human activities and environmental changes, and verifies the accuracy of prediction about the environmental impacts. It ensures compliance with regulatory measures and understanding the degree of implementation of ESPM and its effectiveness. The monitoring results used extensively during the environmental auditing.

The Tanzanian ESIA regulations require the developer to prepare and undertake monitoring plan and regular auditing. Monitoring needed to check if and to what extent the impacts are mitigated, benefits enhanced and new problems addressed. Recommendations for monitoring have been included in the ESMP (**Table 36 and 37**). The ESMP also assigns responsibilities for monitoring activities. However, the divisional/ward/village environmental committees and City environmental committee will participate in the long-term daily monitoring of the project road especially during operation.

#### 8.2 Monitoring Parameters

The selection of the parameters to monitor based on the high likelihood of occurrences of the selected parameters. Monitoring of these parameters done in various stages of the project as follows;

- Pre construction stage* – Monitoring of the parameters at this stage is meant to establish the baseline information of the target parameters in the project area.
- Construction stage*- Monitoring at this stage meant to establish the pollution levels that arise from the construction activities.
- Operation stage* - Monitoring at this stage meant to check on the impacts that might arise as the result of normal use of the infrastructure.
- Decommissioning*- Decommissioning not anticipated in the near future. However, if this will happen, may entail change of use (functional changes) or demolition triggered by change of land use.

Table 36: Environmental and Social Monitoring Plan for the proposed upgrading of Igoma-Kishiri-Buhongwa Road

Parameters		Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (TSH)
<b>Pre construction stage</b>								
<b>Air quality</b>	Dust	Once before the construction starts	At the start, Middle and end of all project roads	µg/m <sup>3</sup>	<i>Micro Dust Pro</i>	<0.01	Mwanza City Council	4,000,000
<b>Noise Baseline</b>	Noise level	Once before the construction starts	At the start, Middle and end of all project roads	dBA	Noise Level Meter	<110	Mwanza City Council	4,000,000
<b>Water Quality</b>	Turbidity, COD, BOD, Ph, DO	Once before the construction starts (During rainy season)	All points where the river cross project roads		APHA 2009	TZS 789:2003	Mwanza City Council	3,000,000
<b>Construction stage</b>								
<b>Air pollution</b>	Dust	Once Per Month	At the start, Middle and end of all project roads	µg/m <sup>3</sup>	<i>Micro Dust Pro</i>	<0.01	Mwanza City Council	4,000,000

Parameters		Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (TSH)
<b>Noise pollution</b>	Noise level	Once per Month	At the start, Middle and end of all project roads	dBA	Measurements	<110	Mwanza City Council	5,000,000
<b>Water Quality</b>	Turbidity, COD, BOD, Ph, DO	Once per month during dry season Everyday during rain season	All points where the river cross project roads		APHA 2009	TZS 789:2003	Mwanza City Council	4,000,000
<b>Soil erosion</b>	Soil erosion along the road	Once in three Months	Project roads	Level of erosions	Site inspection	-	Mwanza City Council	5,000,000
<b>Vegetation</b>	Biomass	Once in three month for construction period	Trees along the road	-	Inspection	-	Mwanza City Council	6,000,000
<b>Vibration</b>	Vibration levels	Once per Month	Project road	No per time	Records	-	Mwanza City Council	5,000,000
<b>Frequency of illness of construction workers</b>	Illness of construction workers	Once in a month for the construction period	Project site	Number of cases	Health records	-	Mwanza City Council	5,000,000

Parameters		Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (TSH)
<b>Employment opportunity</b>	Percentage of local construction labourers	Three times a year	Project site	Number of local people employed in the project	Records, inquiries and observation	-	Mwanza City Council	4,000,000
<b>Safety and health risks</b>	Number and type of safety equipment such as mask, helmet gloves and ear plugs. Health and sanitation facilities in camps.	Once in three month	Project site	Number of safety measures provided	Actual injuries and illness statistics	-	Mwanza City Council	4,000,000
<b>Dust Suppression</b>	Water sprinkling	Everyday	Project site	Frequency of water sprinkling	Inquiries and observation	Minimum dust emission	Mwanza City Council	5,000,000
<b>Operation stage</b>								
<b>Safety of human beings</b>	Road accidents and roads	Three times a year for the project life span	Project site	Road signs and number of	Records, inquiries and illness statistics	Zero accident and sufficient	Mwanza City Council	4,000,000

Parameters		Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (TSH)
	signs			accidents		no of road signs		
<b>Total monitoring costs</b>								<b>62,000,000</b>

Table 37: Environmental and Social Monitoring Plan for the proposed upgrading of Mirongo River

Parameters		Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (TSH)
<b>Pre construction stage</b>								
<b>Air quality</b>	Dust	Once before the construction starts	At the start, Middle and end of all project roads	$\mu\text{g}/\text{m}^3$	<i>Micro Dust Pro</i>	<0.01	Mwanza City Council	2,000,000
<b>Noise Baseline</b>	Noise level	Once before the construction starts	At the start, Middle and end of all project roads	dBA	Noise Level Meter	<110	Mwanza City Council	3,000,000
<b>Water Quality</b>	Turbidity, COD, BOD, Ph, DO	Once before the construction starts (During rainy)	All points where the river cross project		APHA 2009	TZS 789:2003	Mwanza City Council	2,000,000

Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (TSH)	
	season)	roads						
<b>Construction stage</b>								
<b>Air pollution</b>	Dust	Once Per Month	At the start, Middle and end of all project roads	µg/m <sup>3</sup>	<i>Micro Dust Pro</i>	<0.01	Mwanza City Council	2,000,000
<b>Noise pollution</b>	Noise level	Once Per Month	At the start, Middle and end of all project roads	dBa	Measurements	<110	Mwanza City Council	2,000,000
<b>Water Quality</b>	Turbidity, COD, BOD, Ph, DO	Once Per month during dry season Everyday during rain season	All points where the river cross project roads		APHA 2009	TZS 789:2003	Mwanza City Council	3,000,000
<b>Soil erosion</b>	Soil erosion along the road	Once in three Months	Along the river	Level of erosions	Site inspection	-	Mwanza City Council	3,000,000
<b>Vegetation</b>	Biomass	Once in three month for construction	Trees along the	-	Inspection	-	Mwanza City	3,000,000



Parameters		Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (TSH)
		period	river				Council	
<b>Vibration</b>	Vibration levels	Once per Month	Project road	No per time	Records	-	Mwanza City Council	3,500,000
<b>Frequency of illness of construction workers</b>	Illness of construction workers	Once in a month for the construction period	Project site	Number of cases	Health records	-	Mwanza City Council	5,000,000
<b>Employment opportunity</b>	Percentage of local construction labourers	Three times a year	Project site	Number of local people employed in the project	Records, inquiries and observation	-	Mwanza City Council	3,000,000
<b>Safety and health risks</b>	Number and type of safety equipment such as mask, helmet gloves and ear plugs. Health and sanitation facilities in	Once in three month	Project site	Number of safety measures provided	Actual injuries and illness statistics	-	Mwanza City Council	4,000,000

Parameters		Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (TSH)
	camps.							
<b>Dust Suppression</b>	Water sprinkling	Everyday	Project site	Frequency of water sprinkling	Inquiries and observation	Minimum dust emission	Mwanza City Council	2,000,000
<b>Operation stage</b>								
<b>Safety of human beings</b>	Floods and soil erosion	Three times a year for the project life span	Project site	Water level and level of erosion	Site inspection	-	Mwanza City Council	4,000,000
<b>Total monitoring costs</b>								<b>41,500,000</b>

## **8.3 Grievances Redress Procedures**

### **8.3.1 Purpose**

A Grievance Redress Mechanism (GRM) is necessary for addressing the legitimate concerns of the project affected persons. Grievance handling mechanisms provide a formal avenue for affected groups or stakeholders to engage with the project on issues of concern or unaddressed impacts. Grievances are any complaints or suggestions about the way a project is being implemented, and they may take the form of specific complaints for damages/injury, concerns around resettlement and compensation, concerns about routine project activities, or perceived incidents or impacts.

The stakeholder engagement process will ensure that the PAPs are adequately informed of the procedure. The GRM is designed with the objective of solving disputes at the earliest possible time, which will be in the interest of all parties concerned and therefore, it implicitly discourages referring such matters to a tribunal/court for resolution.

### **8.3.2 Principles**

A functional GRM has to be established and/or strengthened at the Mwanza City Council in order to ensure grievances emanating from the TACTIC project implementation are reported and raised accordingly. GRM is necessary for addressing the legitimate concerns of the project affected persons (PAPs). In addition, GRM provide a formal avenue for affected groups or stakeholders to engage with the project on issues of concern or unaddressed impacts. In the interest of all parties concerned, the GRMs are designed with the objective of solving disputes at the earliest possible time. Such mechanisms are fundamental to achieving transparency and voicing PAPs' concerns about overall project activities.

### **8.3.3 Construction GRM**

This will be administered by the respective project implementing contractors and will address grievances associated with the construction of roads and upgrading of Mirongo River.

#### ***Step One: Submission of Grievances***

The affected person shall file their grievance to the GHO, which will be recorded in writing. The grievance note should be signed and dated by the aggrieved person. A grievance can be submitted to in a number of ways as follows:

- through suggestion box (which will be in accessible locations including at construction site).
- during regular meetings held with stakeholders;
- through the Local Consultative Forums established in the affected locations;
- during informal meetings;
- through communication directly with management – for example a letter addressed to site management/ city council;
- email, what's app messages and telephone (where appropriate); and
- all complaints about abuse in service, potential corruption must be channelled to proper authorities no more than 5 days after the complaint is received.

### ***Step Two: Logging the Grievance***

The CGC keeps records of all complaints received, whether and how the CGC resolved them, and which complaints were forwarded to the city council. Once a grievance has been received it must first be logged in the grievance database register by the CGC. A sample grievance logging form is provided in **Appendix VIII**.

Anonymous grievances will be accepted recognizing that this may limit the possibility of investigation and resolution. Those who collect grievances will be trained on how to collect grievances related to GBV in the appropriate manner (see below).

### ***Step Three: Providing the Initial Response***

The person or community or stakeholder that lodged the initial grievance will then be contacted within 2-3 days to acknowledge that CGC has received the complaint. This response will either accept or refute responsibility for the grievance. This notification will include details of the next steps for investigation of the grievance, including the person/department responsible for the case and the proposed timeline for investigation and resolution which will depend on the severity of the incident. In some cases, it may be necessary to provide an immediate response to avoid further harm while more detailed investigations are undertaken e.g., in the case of fatalities, workplace accidents, community safety pollution of natural resources, conflict with communities etc.

### ***Step Four: Investigating the Grievance***

The CGC will aim to complete investigation within two weeks of the grievance first being logged. Depending on the nature of the grievance, the approach and personnel involved in the investigation will vary. A complex problem may involve external experts for example. A simpler case may be easier, and quicker to investigate. The CGC will involve the aggrieved person/people in this investigation, where possible, to ensure participation. The CGC will continually update the aggrieved on the progress of the investigation and the timeline for conclusion. Unless highly complex, the investigation will be completed within 14 days, although efforts should be made to complete this process faster.

### ***Step Five: Communication of the Response***

The CGC will outline the steps taken to ensure that the grievance does not re-occur and any measures needed to resolve the complaint. The response will be communicated within 1 day of the resolution being determined.

### ***Step Six: Complainant Response***

If complainant is satisfied then SGC will seek their sign off from the complainant and determine what if any follow up is needed to monitor the implementation of the resolution. The resolution will be implemented promptly. This may happen at the time the resolution is proposed or within a timeframe agreed between the CGC and complainant but ideally within 5 days.

### ***Step Seven: Grievance Closure or Taking Further Steps if the Grievance Remains Open***

Once the measures have been implemented to the complainant's satisfaction the grievance will be closed. If, however the grievance still stands then the CGC will initiate further investigation and determine the steps for future action. Once all possible redress has been proposed and if the complainant is still not satisfied then they will be advised of their right to appeal to the next level as outlined above.

If the grievances cannot be resolved at the Mwanza City Council or PIU at PORALG, the complainant will be advised of their right to legal recourse.

### **8.4 Gender Based Violence (GBV)**

The Project may result in incidences of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA) affecting workers and the community. GBV cases are different from other complaints that are typically handled through the grievance redress mechanisms. As outlined in the ESMF, a GBV action plan will be developed for the Project and will be modified for each PIUs once service providers have been identified. A GBV referral pathway will be identified within Mwanza City Council with the appropriate capacity and quality of service delivery. The CGC will be trained on how to manage GBV related grievances including matters of confidentiality, treating survivors with empathy and what non-identifiable data will be collected and how to close the case.

In cases involving a Project Worker, the contractor and PIUs will be advised about the case who will in turn inform the GBV Specialist at the national level who will instigate any investigation required involving the contractor, PIUs, services providers etc. They will then recommend action to be taken by the contractor/CGC in ensuring that administrative sanctions are taken against an alleged perpetrator of sexual assault.

### **8.5 Adaptation for Vulnerable Groups**

This GRM will be presented to Vulnerable Groups and adapted as needed to meet their requirements and decision-making processes while maintaining the principles underlying the mechanism and the roles and responsibilities. Such adaptations will be discussed and agreed during the preparation of the Vulnerable Groups Plans but may include roles for traditional leaders and decision-making processes for example in addressing land issues. The aim for this adaptation is to ensure that vulnerable groups are able to raise their concerns in a manner they feel will be listened to and which they feel is accountable to them.

### **8.6 Operational GRM**

Grievance emanating from the operational activities, will be handled at the Mwanza City Council ideally through the appointed *Grievance Handling Officers (GHOs)*. At the council level a Grievance Handling Officers comprising of TACTIC Project Coordinator, Environmental Officer and Community Development Officer/Sociologist will be responsible for addressing all grievances related to Project performance. The GHOs shall maintain records where grievances and complaints, including minutes of discussions, recommendations and resolutions made, will be recorded as outlined below which will be adapted, where relevant, to align with the council while maintaining the requirements outlined.

To ensure effectiveness and efficiency, GRM the procedures for handling grievance will be simple. The GHOs shall maintain records where grievances and complaints, including minutes of discussions, recommendations and resolutions made, will be recorded. Quarterly reports on grievances received, registered, resolved or channelled to the appropriate departments staff for explanation or resolution as well as grievances referred to the responsible Government Institutions for further scrutiny such as the *Prevention and Combating Corruption Bureau-PCCB*, *Commission for Human Rights and Good Governance-CHRGG*, *security and legal recourse*, will be submitted to the Grievance Redress Integrity Committee (GRIC) for discussion and way forward.

The GRM has the following steps:

**Step 1:** The Project Affected Person (PAP) shall file the grievance through a special e-mail established for receiving grievances, suggestion boxes, meetings or directly to the GHO who will record grievances/complaints receipt and resolution form. Grievance will be recorded in the grievance/complaints register. All alternative ways of submitting grievances to the management of the Mwanza City Council will be made known to the PAPs for easy communication.

The GHOs will keep records of all complaints received and the responses made in order to track the resolution of grievances. The GHO will acknowledge the complaint has been received. The response will either accept or refute responsibility for the grievance and next step will be the investigation and resolution or immediate actions to be taken. The GHOs will aim at completing investigation within two weeks of the grievance first being logged and will involve the aggrieved person/people in this investigation to ensure their views are incorporated.

If complainant is satisfied, the GHOs will seek their sign off and determine if any follow up is needed to monitor resolution implementation. Once the measures have been implemented the grievance will be closed. If the grievance still stands then the GHO will initiate further investigation and determine the steps for future action.

**Step 2:** If the PAP is not satisfied with decision of GHOs, the grievance is referred to the Grievance Redress Integrity Committee (GRIC) respond within 2 weeks' time from the submission. The GRIC members would preferably be senior staff who would be required to present the status of Grievance handling to the decision organ of the responsible Institution for discussion and decision on proposed mitigation measures. GHOs will present the report of the number of grievances registered and attended to the Grievance Redress Integrity Committee (GRIC) for discussion and way forward.

**Step 3:** If the PAP is not satisfied with decision of GRIC, the grievance is reported to the TACTIC Project Implementation Unit at the council.

**Step 4:** If the PAP is not satisfied with decision of the council, the grievance(s) is reported to PORALG. If the PAP is not satisfied with decision of PORALG, he/she is will channel the grievance to legal redress.

The TACTIC project GRM flow chart is presented in **Figure 20**.

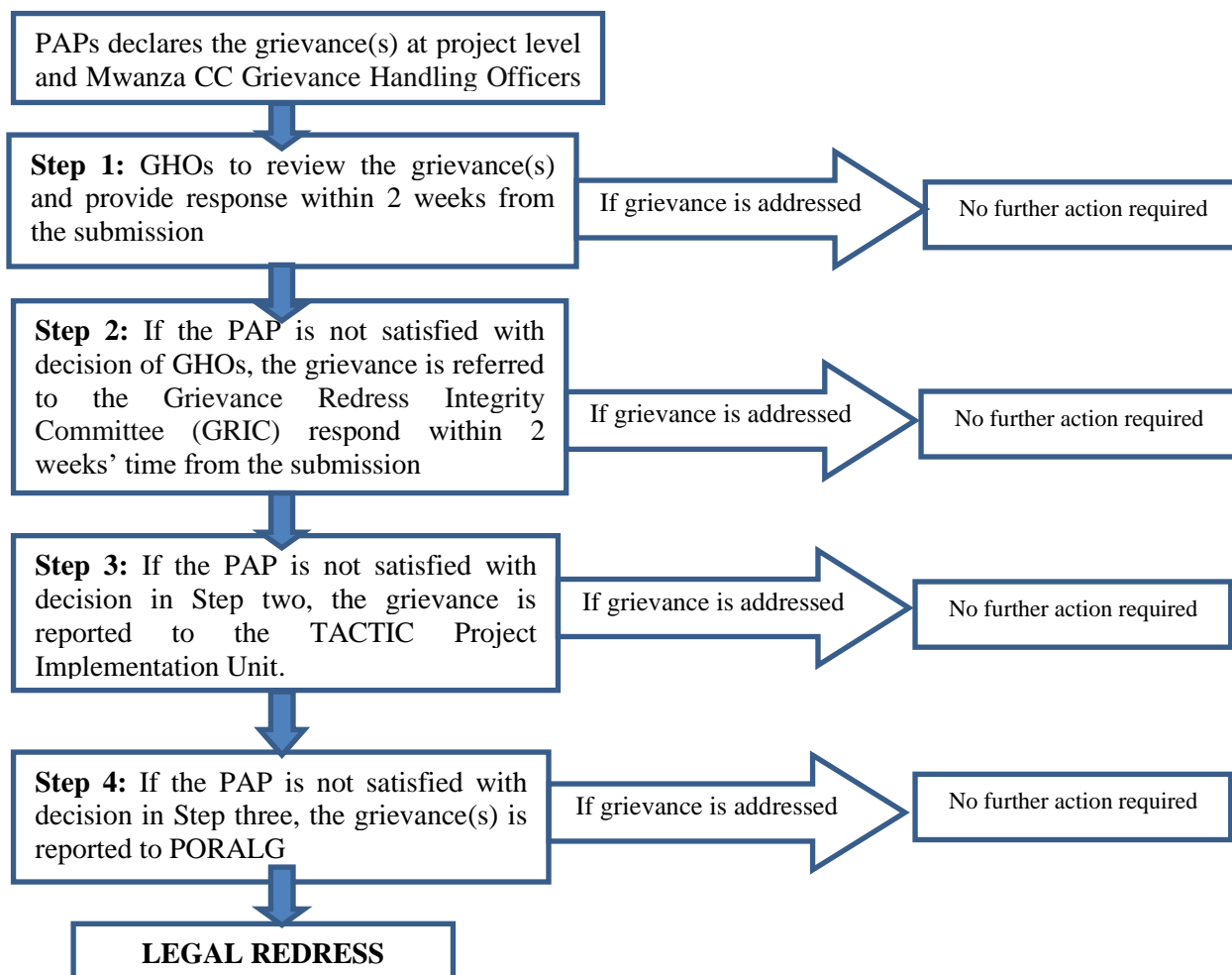


Figure 20: The flow chart for steps in Construction and General GRM

### 8.7 Gender Based Violence (GBV) Grievance Redress Mechanism:

In case of complaints related to Gender Based Violence (GBV), the GHO will treat these grievances with due confidentiality. Specific provisions will be included for complaints related to Sexual Exploitation and Abuse (SEA) that could be derived from the project to ensure the survivor's confidentiality and rights. The GRM will ask for, or record, information on three aspects related to the GBV incident: (a) the nature of the complaint (what the complainant says in her/his own words without direct questioning, (b) if, to the best of their knowledge, the perpetrator was associated with the project, and (c) if, possible, the age and sex of the survivors. Survivors will be advised of their right to referral pathways include security and legal recourse, health services and, psychosocial counselling. Details of the GBV GRM will be included in the GBV action plan.

### 8.8 Resettlement Grievance Redress Mechanism

Resolution of involuntary resettlement and construction related grievances will be handled by the existing land dispute resolution structures established at the village/mtaa level to the Ward and District level. The project affected persons (PAPs) shall file the grievances to the local government (village/mtaa) office for mediation and resolution of disputes emanating from resettlement issues.

In situations where PAPs are not satisfied with the mtaa government decision on resettlement disputes, the PAPs can approach the Mtaa Adjudication Committee (MAC) for mediation. The VLC will try as much as possible to arrive at a compromise for the complaints raised. This may be obtained through series of conciliations, mediations and negotiations exercises between the two parties (*the PAPs, the subproject proponents and City Director*). If disagreement on the resolutions persists, the PAPs will be allowed to submit their appeal to the Ward tribunal, District land and Housing tribunal, Ministry of Land, Housing and Human Settlement Development before being transferred to the court of law and court of appeal, where necessary, with a view to determine claims validity and compensation required. The response time for cases handled will depend on the issues addressed but it will be as short as it is possible.

### **8.9 Records Keeping of GRM**

All comment responses and, grievances are to be logged using grievance logging forms and registers. This includes details of the claim/grievance/complaint, the claimant/aggrieved, and ultimately the steps taken to resolve the grievance. A master database will be maintained by the CGC to record and track management of all grievances. Regardless of the actual establishment of such a database, typically documentation on grievances keeps track of the following:

### **8.10 Monitoring of GRM**

It is vitally important to monitor the effectiveness of the grievance mechanism. Appropriate measures for this include monthly reporting on the number of grievances received, resolved and outstanding and associated timeframes. This will be undertaken by the CGCs and reported to City Council/PORALG. As part of stakeholder engagement and consultation, involving the views of the stakeholders for whom the Grievance Mechanism is designed will be part of PORALG Monitoring.



## **CHAPTER NINE**

### **COST BENEFIT ANALYSIS**

#### **9.1 Introduction**

Development of this project is not an investment project that the developer expected to gain profit during its operation. The road network improvement measures aim to provide safe and efficient access to social and economic activities by removing flow constraints, supporting the present and projected economic and social development in Mwanza City Council. In that view the analysis provided below is qualitative based than quantitative since it is not possible to convert all the benefits of having the good roads to into monetary terms.

##### **9.1.1 Benefits related to the project**

The proposed project is expected to have the following benefits;

- Improved Transport in Mwanza City Council
- Reduced traffic congestion
- Increase property value

##### **9.1.2 Costs related to the project**

The cost for the proposed is estimated to be 22 billion Tanzanian Shillings. The estimated costs for implementing impact management as well as monitoring process as outlined earlier is about **275,000,000 TSHS** and **103,500,000 TSHS** respectively. Since some of the impacts will only be realized during construction phase, the costs for these will also be short term, especially if mitigation measures are fully implemented the project benefits outweigh the project costs by far.

## **CHAPTER TEN**

### **DECOMMISSIONING**

#### **10.1 Introduction**

As decommissioning is not anticipated to take place in the remote future, the specific conditions for mitigation are generally inherently uncertain. In view of this, specific mitigation measures pertaining to environmental impacts of decommissioning works cannot be proposed at the moment with a reasonable degree of certainty. A detailed decommissioning plan that takes environmental issues into consideration shall be prepared by the developer prior to the decommissioning works. Should it be done, decommissioning may entail change of use (functional changes) or demolition triggered by change of land use. Therefore what is presented here is just a Detailed Decommissioning Plan which give light to what shall be done if the need for decommissioning arise.

#### **10.2 Detailed Decommissioning Plan**

This Section provides a brief outline of the works required to demolish the Proposed infrastructures on the site incase it happen. This Plan will be used as a reference document that provides the framework to ensure that demolition activities on the site do not adversely affect the health, safety, traffic or the environment of the public and neighbouring properties. The Contractor will be required to prepare a detailed Demolition Plan and Construction Management Plan to the satisfaction of the Proponent and relevant Authorities prior to the commencement of works on site.

##### **10.2.1 Demolition Methods**

It is anticipated that the Contractor will prepare a detailed Demolition Plan prior to the commencement of work on site, however, the indicative demolition methodology will be as follows:

- The strip out and removal of non-structural elements will be undertaken utilising manual labour and small plant including – bobcats, 3-5t excavators and dingo type loaders.
- The materials will be removed from site using small to medium sized trucks.
- The structures will be demolished using larger plant and equipment including 15-40t hydraulic excavators. These machines will be equipped with rock breakers, pulverisers and the like which would be used in a sequential manner.
- During the demolition process erosion control measures will be established. These will include treatment of dust and potential discharge into stormwater systems.

##### **10.2.2 Materials Handling**

Materials handling will be by mechanical plant (including excavators and bobcats) loaded into trucks (bogie tippers and semi trailers). The debris will be carted offsite to an approved waste facility or recycling centre. The contractor shall submit a Demolition Waste Management Plan to Mwanza City Council which outlines the objectives of:

- maximisation, reuse and recycling of demolition material
- minimisation of waste disposal
- evidence of implementation for specified arrangements of waste management

On-site storage of reusable materials will occur at Site. Recycling and disposal containers will also be accommodated at this location for collection vehicles. Hazardous materials will be treated separately. A hazardous materials inspection will be undertaken by an accredited consultant and a report issued. Hazardous materials will be removed in accordance with EMA 2004. A final clearance report will be provided by the hygienist which will include the provision of tip dockets from waste centres.

#### 10.2.3 Proposed Sequence

The Contractor will be required to prepare the following documentation prior to the commencement of demolition and/or excavation works:

- Dilapidation Survey
- Construction Waste Management Plan
- Demolition Management Plan

#### 10.2.4 Protective Measures

An A Class hoarding will be erected around the perimeter of the construction site prior to the commencement of demolition works. Additionally, wherever the risk arises of material falling into public areas, overhead protection will be provided in the form of a B Class hoarding. Scaffolding will be erected to facades where materials could fall in excess of 4m. The scaffolding will be clad with chainwire and shade cloth to enclose debris and dust onto the site. During the demolition, dust control measures will be used to minimise the spread of dust from site. The Contractor will have a senior representative on site at all times to ensure compliance with the safety guidelines and agreed work methods.

#### 10.2.5 Traffic Management

The management of construction traffic during the decommissioning phase will be subject to the provision of a detailed traffic management plan. This plan will be prepared by the Contractor for the various stages of demolition. During demolition, all traffic will be held within the site boundaries. The site will remain closed to pedestrian traffic and will be generally manned by security.

#### 10.2.6 Occupational Health and Safety

A detailed OH&S Policy will be provided by the Contractor prior to work commencement. A detailed Site Safety Plan will be prepared for the specific project.

#### 10.2.7 Environmental Management Plan

A detailed Environmental Management Plan will be provided by the Contractor prior to the commencement of the work.

### **10.3 Potential Impacts and Mitigation Measures**

#### 10.3.1 Dust and Noise Pollution

The demolition activities for the remained part (foundation structure) shall be accompanied with emission of a lot of dusts since the demolition works are expected to be carried out by

conventional method using mechanical breakers and jackhammers. However, alternative methods of demolition including explosive techniques can be used.

#### ***Mitigation Measures***

- Water sprinkling shall be applied to open earth to reduce dust emission.
- Trucks transporting construction materials shall be covered if the load is dry and prone to dust emissions.
- The demolition area shall be fenced by iron sheets; this will prevent the dust at the ground to be picked up by the wind.
- Community notification shall be undertaken where appropriate where work is likely to cause dust impact on the public and nearby residents.
- Sound construction equipment, with noise sinks, shall be used
- Machine operators in various sections with significant noise levels shall be provided with noise protective gear.
- Construction equipment shall be selected, operated and maintained to minimize noise.

#### **10.3.2 Increased Waste**

A lot of demolition waste is expected as a result of the demolition of these blocks. These shall include blocks, concrete, reinforcements, pipes etc. Most of the block materials shall be salvaged and recycled.

#### ***Mitigation Measures***

- All materials which can be reused shall be reused
- Materials that cannot be reused shall be sent to the authorized dumpsite

#### **10.4 Costs for Undertaking the Mitigation Measures**

The cost for undertaking Mitigation measures during decommissioning is estimated to be 50 million TSHS.

#### **10.5 Closure of borrow pit, quarry sites and camp sites operations**

The abandonment of the Project works and site reclamation for the quarries and borrow pits will be undertaken at or before the close of the Project. The works will be integrated into the overall Project Abandonment and Reclamation Plan, although separate closure plans for each quarry and borrow pit will be required. Closure of the Project will involve removing construction materials, equipment and infrastructure and reclaiming the site to self sustaining productive ecosystem near its original condition.

## **CHAPTER ELEVEN**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **11.1 Summary and Conclusions**

The ESIA study results show that although there are some limited negative environmental implications of the project, the local roads will have high socio-economic benefits to the people of Mwanza City Council. The associated negative impacts, to a large extent have been minimized through good engineering design and envisaged construction practices. Specific mitigation measures have been suggested in this report to offset some of the inherent adverse impacts. Implementing these mitigation measures would increase environmental soundness of the project road. The abandonment of the Project works and site reclamation for the quarries and borrow pits will be undertaken at or before the close of the Project. The works will be integrated into the overall. Project Abandonment and Reclamation Plan, although separate closure plans for each quarry and borrow pit will be required. Closure of the Project will involve removing construction materials, equipment and infrastructure and reclaiming the site to self sustaining productive ecosystem near its original condition. It is, therefore, concluded that, implementation of the proposed project will entail no detrimental impacts provided that the recommended mitigation measures are adequately and timely put in place. The identified adverse impacts shall be managed through the proposed mitigation measures and implementation regime laid down in this EIS. Mwanza City Council is committed in implementing all the recommendations given in the EIS and further carrying out the environmental auditing and monitoring schedules.

#### **11.2 Recommendations**

- Mwanza City Council should be allowed to construct Igoma – Buhongwa road and the Mirongo river because it has no detrimental impacts to environment or Social once mitigation measures proposed are to be implemented.
- Mwanza City Council must abide to the Mitigation measures to combat impacts Identified in this report.
- Contractor must abide safety and health mitigation measures during construction as well addressed in mitigation measures

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## APPENDICES

### Appendix I: Terms of References

#### **Environmental and Social Impact Assessment for the Proposed Improvement of Igoma – Kishiri – Buhongwa Road (14 Km) in Igoma, Kishiri, Lwahnima and Buhongwa Wards and Rehabilitation of Mirongo River (5.9 Km) in Nyamagana, Mirongo, Pamba, Mbugani, Mabatini, Mahina and Mhandu Wards in Mwanza City, Mwanza Region**

### 1.0 INTRODUCTION

The detailed scope for undertaking Environmental and Social Impact Assessment is intended to guide the Consultant to address relevant environmental and social issues during the assessment process. Among others, the ESIA conducted in accordance with the requirements of the Environmental Management Act No. 20 of 2004 and Environmental Impact Assessment and Audit regulations (2005). The Consultant shall do everything necessary to meet the objectives of the services and not less than the following tasks that undertaken during the Environmental and Social Impact Assessment. In the process of consultation (Scoping process) with relevant stakeholders like environmental authorities, the Consultant may further be required to finalize the Terms of Reference for the undertaking of ESIA according the agreement with these stakeholders.

### 2.0 OBJECTIVE OF THE ASSIGNMENT

The main objective of the consultancy services is to undertake Environmental and Social Impact Assessment (ESIA) for the upgrading of Igoma – Buhongwa Road and the construction of Mirongo River. The ESIA will address environmental and social impacts which may arise from the upgrading the proposed road and provide mitigation plan to prevent or minimize adverse impacts.

### 3.0 SCOPE OF WORK

#### **TASK 3.1: PROJECT REGISTRATION AND PREPARATION OF PROJECT BRIEF**

Before undertaking, the environmental and Social Impact assessment the consultant has to fill ESIA Registration form and prepare project brief. The filled ESIA registration form and project brief should be submitted Inception stage.

#### **TASK 3.2: SCOPING**

The Consultant shall carry out scoping exercise and prepare Scoping Report. The Scoping Report should include the following:

- Background of the project and objective of the assignment
- Project description
- An outline of how the scoping exercise was undertaken.
- Identification of issues and problems
- Synthesis of results of Scoping exercise (potential positive and negative impacts)
- Project boundaries in terms of spatial, temporal and institutional aspects
- Stakeholder's consultation. This will cover all levels of stakeholder identification, record their concerns and indicate how they were involved. This list of stakeholders consulted appended in the Scoping Report.
- Project alternatives,



In the undertaking of scoping exercise, the Consultant has to refine the framework TOR given by the Client to cover environmental issues, which may emerge from the consultation during the scoping exercise. The Refined TOR appended to the Scoping report. The Scoping Report should be submitted with the Inception Report for review and be submitted to the National Environment Management Council for further review and approval.

### **TASK 3.3. UNDERTAKING OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT**

#### **Sub-Task (I): Introduction**

The Consultant shall provide description or profile of the developer, background to the project proposal and its justification, need and purpose of undertaking the study, ESIA study methodologies and approaches applied and structure of the report.

#### **Sub-Task (ii): Description of the Proposed Project**

The Consultant shall describe project components and activities to be implemented in each phase of project life cycle i.e., pre construction, construction, post-construction (demobilization) and operation. This part meant to give a general idea of what the project will entail. To avoid unnecessary details, focus on the project activities based on project phases i.e., mobilization or pre-construction phase, construction phase, operation phase and decommissioning and demobilization phase. The description shall include the following information:

- Background information:
- Background information shall include: Title of the proposed project and developer; Project justification and objectives; Funds and source of funding or financier(s); Project location including maps of appropriate scale; Project design, size, and capacity; Area of influence of the road works; Project life span and Project components; Land size required;
- Project activities; Description of project activities shall be based on phases of project life cycle i.e., mobilization or pre-construction, construction, operation and maintenance, demobilization and decommissioning phases:

#### *Mobilization or Pre-construction activities;*

Describe issued pertaining to land acquisition; construction camp and site workshop; project design; land dispossession and property evaluation; relocation and compensation arrangements

#### *Construction activities;*

Describe all associated activities during construction work such as extraction of raw materials and water; blasting; cut and fill; land clearance; soil and gravel compaction and levelling, demolition of structures along the road reserve; liquid and solid waste generation and disposal; etc.

#### *Operation and maintenance activities;*

Identify and describe all the associated activities to conducted during road operation and maintenance such as road safety measures, operation and management of road facilities along the road such as public toilets, etc.

#### *Demobilization and decommissioning activities;*

Identify and elaborate on the activities to be conducted during demobilization or decommissioning of the road project including movement and demolition of construction facilities, restoration of borrow pits, termination of the temporary workers' employment, waste management, etc.

*Project Requirements:*

Identify all types, sources and quantities of construction materials, equipments and chemicals required by the project. Source and quantities of water, energy, manpower (Staffing and support) and other facilities and services required in each phase of project life cycle;

*[Note: specify any other type of information relevant to the description of the project category.]*

**Sub-Task (iii): Provide Baseline Condition or Description of the Environment**

In order to forecast the impacts, it will be necessary to determine the initial reference or baseline state. It is therefore, required to describe the existing environment that would be directly and/or indirectly affected by the construction of the proposed road project. The 'environment' to be affected must be based on the broad definition of the term that would include biophysical, socio-economic, cultural and historical factors. Only those environmental factors that are necessary to understand the impacts of the planned development should be considered. Assemble, evaluate, and present baseline data on the relevant environmental characteristics of the study area. Include information on any changes anticipated before the project commences.

(a) Physical environment: This shall cover geology; topography; soils; climate and meteorology; ambient air quality; surface and groundwater hydrology; existing sources of air emissions; existing water pollution discharges; and receiving water quality;

(b) Biological environment: flora; fauna; rare or endangered species; ecologically Important or sensitive habitats, including Game and Forest reserves, significant natural sites; species of commercial importance; and species with potential to become nuisances, vectors, or dangerous (of project site and potential area of influence of the project); and Socio-cultural environment: population; land use; planned development activities; Community structure; employment; distribution of income, goods and services; recreation; public health; Gender issues and HIV/AIDS, cultural / historic properties; tribal peoples; and customs, aspirations, and attitudes to the project.

The consultant shall indicate sources of data and methodologies used to acquire data. The relevant international and national standards of noise levels, water and air quality etc. applied when comparing between the existing and anticipated impact of project.

**Sub-Task (iv): Describe Legal, Policies and Administration Framework**

Describe the policy, legal, institutional framework as well as Regulations, strategies, standards, international conventions and treaties that are of relevance to the environmental management and the proposed undertaking in particular. They should be those, which relate to but not limited to environmental quality, health and safety, protection of sensitive areas and protection of endangered species. The objective of this section is to show compliance of the developer with the existing policies, laws administrative/institutional conditions both at national and international levels.

The following, but not limited to, are the relevant policies and legislation to be cited in relation to the proposed project undertakings.

<b>Policies, Regulations and Guidelines</b>	<b>Legislation</b>
<p>Tanzania Wildlife Policy (1998);  National Environmental Policy (1997);  National Water Policy (2002);  National Forestry Policy (1998)  National Gender Policy (2002)  National Transport Policy (2003)  National Agriculture and Livestock Policy (1997)  National Land Policy (1995)  National Mineral Policy (1997)  National Energy Policy (1992)  National Human Settlement Development Policy (2000)  National Policy on HIV/AIDS (2001)  Construction Industry Policy (2003)  National Policy for National Parks (1994)</p> <p><b>Regulations, Strategies and Guidelines:</b>  Environmental Impact Assessment and Audit Regulations (2005);  Mining (Environmental management and Protection) Regulation (1999)  Environmental Assessment and Management Guidelines in the Road Sector (2004);  Land Regulation (2001); and  National Strategy for Growth and Reduction of Poverty (NSGRP - MKUKUTA -2003)  Environmental Code of Practice for Road Works (2009);  Tanzania Development Vision 2025 (2000)  Road Sector Compensation and Resettlement Guidelines (2009)</p>	<p>Road Act (2007);  Environmental Management Act (2004);  Railway Act No 4 (2002)  Energy and Water Utilities Authority (EWURA) Act (2001)  Water Resources Management Act No 11 of (2009),  Beekeeping Act No. 15 (2002)  Mining Act No. 14/10 (2010);  Occupational Health and Safety Act (2003)  HIV and AIDS (prevention and Control) Act No. 28/08 (2008)  Wildlife Conservation Act (2009);  Local Government Laws (Miscellaneous Amendments) Act (2006), No. 13/06;  TANAPA Act (1959);  Village and Urban Land Acts (1999);  Land Act No. 2/04 (2004), amendment of the Land Act (1999);  Forestry Act No. 14 (2002);  Antiquities Act (1964), Rules 1999  Tourism Act (2008)  Employment and Labour Relations Act (2004) No. 6/04  Explosives Act (2002)  Urban Planning Act (2007)  Land Use Planning Act (2007)  Worker’s Compensation Act (2008)  Public Health Act No. 1/09 (2009)  Graves Removal Act (1969)</p>

Apart from country policies and legislation the World Bank Environmental and Social Framework (ESF) which describes Environmental and Social Standards (ESS) will also be used. The ten ESSs as per the WB ESF are: ESS 1: Assessment and Management of Environmental and Social Risks and Impacts; ESS 2: Labor and Working Conditions; ESS 3: Resource Efficiency and Pollution Prevention and Management; ESS 4: Community Health and Safety; ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement; ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources; ESS 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities; ESS 8: Cultural Heritage; ESS 9: Financial Intermediaries; and ESS 10: Stakeholder Engagement and Information Disclosure. Given the

nature of activities of this project, with the exception of ESS 9: Financial Intermediaries almost all the ESSs will be relevant.

**Sub-Task (V): Stakeholder Consultations and Public Involvement.**

The Consultant shall identify and consult all the relevant stakeholders at national, regional and local levels. These include the Government Agencies, local NGOs, affected groups and other interested parties in order to obtain their views regarding the proposed road works. Indicate who are they, where are they, why they are important in this project, which issues are critical to them and how they will be involved in the ESIA study. Particular attention shall be paid to the disadvantaged groups (e.g., children, the elderly and women) that may be affected by the proposed road project. The consultant shall describe methodology applied during stakeholder consultations and public participation such as consultative meetings, household, focus groups interviews and other most appropriate methods to establish public views on the proposed project. At least one meeting with city council Environmental Committee held to obtain their views on the project and its implication to the environment and social aspects. Consultant shall propose public consultation programme during the ESIA study and the most appropriate methods to establish public views used. The consultation process should be open and transparent to ensure that the views of interested and affected parties incorporated in the project design. A summary of issues and response in table form indicating sections, which address them, should be prepared.

There should be evidence in the EIS to the effect that there were stakeholders' consultations at all levels. Photographs, minutes of the meetings, names and signatures of consulted people could be useful in this regard.

Among others, the consultations should ensure the involvement of the following:

- Mwanza City Council
- Local Governments in the project area;
- National Environment Management Council;
- Local Communities
- Roads Users
- Commuter buses operators
- TANESCO and
- MWAUWASA
- TARURA Council Office
- Mtaa and Ward Leaders

**Sub- Task (Vi): Analysis of Alternatives to the Proposed Project**

The Consultant shall describe different project alternatives that were examined in the course of designing the proposed project and identify other alternatives, which would achieve the same objectives. Including the 'No action' alternative to demonstrate environmental and social conditions without the project, consideration of alternatives should extend to siting, design, technology, construction techniques, phasing and schedule, and operating and maintenance procedures alternatives.

Compare alternatives in terms of potential environmental and social impacts; capital and operating costs; suitability under local conditions; and institutional, training, and monitoring requirements. When describing the impacts, indicate which are irreversible or unavoidable and which mitigated. To the extent possible, quantify the costs and benefits of each

alternative, incorporating the estimated costs of any associated mitigating measures. Various environmental and social criteria developed to select the best road alternatives.

### **Sub-Task (vii): Impact Identification and Assessment**

The Consultant shall identify, analyze and assess environmental impacts of the proposed road works on natural resources, human beings and the ecosystems based on the phases of project life cycle i.e., mobilization or pre-construction phase, construction phase, operation phase and decommissioning and demobilization phase. Methods applied in impact identification and the criteria used in evaluating the levels of impacts significance of the proposed road works must be specified. The impacts analysis should focus on both positive and negative impacts and be able to state whether the impacts are positive or negative; direct or indirect; short term or long term; reversible or irreversible. The Assessment should focus on the potential for negative environmental and social impacts caused by planned and unplanned (spontaneous) in-migration of people; clearing of forestlands for agriculture; increased pressure on fuel wood, fodder and water resources; social disruptions and conflicts; and threats to woodlands and wildlife species composition and habitats.

The assessment should also examine the potential for linear resettlement that usually involves projects producing linear patterns of land acquisition. An overview provided of different groups of people and their cultural, ethnic, and socio-economic characteristics, and how they are likely to benefit and/or affected by the project. Negative impacts may include but not be limited to physical relocation, loss of land or other physical assets, or loss of access to livelihood. The consultant should identify the properties along the proposed road, which affected by the implementation of the road. The type and number of the properties to affected should be indicated and be evaluated for compensation. Furthermore, the names and address of the properties' owners indicated. The consultant shall utilize the information from the valuer to address resettlement issues and develop Resettlement Action Plan.

The ESIA study should clearly identify and analyze cumulative, residue and trans-boundary impacts. Wherever possible, describe impacts quantitatively, in terms of environmental components affected (area, number), environmental costs and benefits. Assign economic values when feasible. Characterize the extent and quality of available data, explaining significant information deficiencies and any uncertainties associated with the predicted impacts. The Consultant should take into consideration existing by-laws, national and international environmental standards, legislation, treaties, and conventions that may affect the significance of identified impacts. The Consultant shall use the most up to date data and methods of analysing and assessing environmental and social impacts. Uncertainties concerning any impact indicated.

The Consultant shall conduct a review of gender issues in the project area, the study shall include the road section influence to the lives of men, the elderly, women, children, and disabled so as to come up with a quantifiable analysis of the benefits which will accrue to them during and after the road construction.

### **Sub-Task (viii): Propose Impact Mitigation Measures**

The Consultant shall suggest cost-effective measures for minimizing or eliminating adverse impacts of the proposed road works. Measures for enhancing positive or beneficial impacts recommended. The costs of implementing these measures shall wherever possible estimated and presented.

One of the mitigation measures for the resettlement impact is compensation. The consultant is therefore required to conduct properties valuation for those properties to affected by the project implementation to effect compensation. The Consultant shall review the ongoing measures on HIV/AIDS awareness creation within the project area and propose for the mitigation measures. The proposal shall include a plan of action, which will identify responsible key implementers, period and expected output.

The proposed mitigation measures and cost estimate shall be grouped in a separate Bills of Quantities (BOQ) for the project and include cost of supervision for the implementation of mitigation measures.

**Sub-Task (ix): Resource Evaluation or Cost Benefit Analysis.**

The Consultant shall undertake qualitative and quantitative analysis of costs and benefits to determine the viability of the proposed project on the environment, social and economic aspects. The Economic Internal Rate of Return (EIRR) and Net Present Value (NPV) of the project at recommended discount rate of 12% should be calculated and provide interpretation of the results.

**Sub-Task (x): Environmental and Social Management Plan (EMP)**

The Environmental Management Plan focuses on three generic areas: implementation of mitigation measures, institutional strengthening and training, and monitoring. The Consultant shall prepare Environmental and Social Management Plan, which will include proposed work programme, budget estimates, schedules, staffing and training requirements and other necessary support services to implement the mitigation measures. Institutional arrangements required for implementing this management plan indicated. The cost of implementing the monitoring and evaluation including staffing, training and institutional arrangements specified. Where monitoring and evaluation will require inter-agency collaboration, this indicated.

Identify institutional needs to implement environmental assessment recommendations. Review the authority and capability of institutions at local, regional, and national levels and recommend how to strengthen the capacity to implement the environmental management and monitoring plans. The recommendations may cover such diverse topics as new laws and regulations, new agencies or agency functions, inter-sectoral arrangements, management procedures and training, staffing, operation and maintenance training, budgeting, and financial support.

EMP should specify impact mitigation plan and environmental monitoring plan requirement. Inject costs, responsibility and timeframe for mitigating each impact and monitoring of each environmental parameter. Impact Mitigation plan and monitoring plan should be based on the project phases i.e., mobilization or Pre-construction, Construction, Operation, Demobilization and Decommissioning phase. Prepare Resettlement Action Plan (RAP) to be implemented in accordance with the National Land Act No 4 and 5 of 1999 (revised in 2004). All properties likely to be affected by the road project should be evaluated for compensation arrangements.

**TASK 3.4: REPORTING**

Notwithstanding the above requirements, the contents and the structure of the Environmental and social Impact Assessment Report should be in accordance with the Environmental Impact Assessment and Audit Regulations of 2005: It is recommended that the Environmental Impact Assessment report closely contain the followings:

- The Report shall be presented as per format stipulated in Regulation 18 (2);
- The Executive Summary of the report should reflect the Regulation 18 (3) requirements;

- The Non-Technical Executive Summary should be a brief stand-alone document both in Kiswahili and English languages starting with the main findings, conclusions and recommendations as required by Regulation 19 (2).
- The cover page to indicate the names and address of the Client, ESIA Consultant and the Reviewer (NEMC)

It recommended that the Environmental and Social Impact assessment report closely contain the followings:

Chapters:

- Introduction
- Project Background and Description
- Policy, Legal and Administrative Framework
- Baseline or existing environmental Conditions
- Stakeholders Consultations and Public Participation
- Project alternatives
- Identification and analysis of Impacts
- Mitigation Measures
- Resources Evaluation or Cost Benefit analysis
- Environmental and Social Management Plan
- Action Plan for Management of impacts
- Environmental Monitoring Plan
- Action plan for Auditing
- Contingency Plan
- Decommissioning/demobilization Plan
- Summary and Conclusions
- References
- Appendices

#### **4.0 STAFFING**

The Consultant should employ an Environmental Impact Assessment Expert, Sociologist and a qualified Valuer for the carrying out of the services.

## Appendix II: NEMC letter for TOR approval



THE UNITED REPUBLIC OF TANZANIA

VICE PRESIDENT'S OFFICE  
UNION AND ENVIRONMENT

NATIONAL ENVIRONMENT MANAGEMENT COUNCIL  
(NEMC)



*In reply please quote:*

Ref: EC/EIA/2022/1409

Date: 24/06/2022

MWANZA CITY COUNCIL,  
P.O. BOX 1333,  
MWANZA.

**RE: APPROVAL OF TERMS OF REFERENCE (ToR) FOR THE PROPOSED  
IMPROVEMENT OF MIRONGO RIVER (8KM) AND UPGRADING OF  
IGOMAKISHIRI-BUHONGWA ROAD (14KM) TO BITUMEN STANDARD,  
MKUYUNI WARD IN MWANZA CITY COUNCIL IN MWANZA REGION**

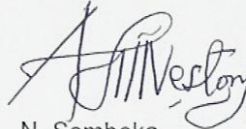
Reference is made to the above-captioned subject.

2. The National Environment Management Council (NEMC) acknowledges receipt of Terms of Reference (ToR) and Project brief for undertaking an EIA for the above-mentioned project.
3. The Terms of Reference have been reviewed and found generally to be adequate to guide the Environmental and Social Impact Assessment (ESIA) study of the named project. The ESIA report should therefore observe the requirements of ESIA and Audit Regulations, 2005 specifically Regulations 51 and 52. Furthermore, the following should also be included in the ESIA report:-
  - i. All key stakeholders are consulted including neighbours and the Local Government Authorities. Their views and concerns should be addressed. Records of meetings, communication and comments should be provided with proof of service. Consultation forms should bear the date and each consulted stakeholder should sign against his/her name as the law requires;
  - ii. Ensure all copies of relevant documents/certificates including the land acquisition process documents showing properties impacted by the project are appended to the report
  - iii. Compliance status of all applicable legal and policy frameworks and their respective requirement is addressed in the ESIA report.
  - iv. The EIA report should discuss the management of the hazardous waste i.e used oil;

Headquarters, 35 Regent Street, P.O Box 63154, 11404 Dar es Salaam, Phone: +255 22 2774852;  
+255 22 2774889; +255 0713 608930/0735 608930 Fax: +255 22 2774901  
Email Address: [dg@nemc.or.tz](mailto:dg@nemc.or.tz) Website: [www.nemc.or.tz](http://www.nemc.or.tz)



4. Upon submission of the ESIA report, the Council will arrange for a technical review of the document by the Cross-sectoral Advisory Committee (AC). Prior to the review, representatives of the AC will visit the project area to inspect the site and verify the adequacy of the ESIA Report. As you submit the ESIA report you will be required to as well pay to the Council a review cost as indicated in the Proforma Invoice that has been generated by the system.
5. We look forward to your cooperation on this matter.



A. N. Sembeka  
For: Director General

Cc: DAR AL HANSADAH



**Appendix III: List of Stakeholders Consulted**

Mwanza CC

**ORODHA YA WADAU WALIOSHIRIKI KATIKA MAJADILIANO KUHUSU UJENZI NA UBORESHAJI WA MIUNDOMBINU  
KATIKA JIJI LA MWANZA**

**STAKEHOLDERS CONSULTATION FOR THE PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT,  
STAKEHOLDER ENGAGEMENT PLAN, RESETTLEMENT ACTION PLAN, LABOR MANAGEMENT PROCEDURES AND  
DESIGN DRAWINGS OF THE PROPOSED INFRASTRUCTURE CONSTRUCTION IN MWANZA CITY COUNCIL**

TAREHE NA MUDA / DATE AND TIME: 14/01/2022 SIKU/DAY: FRIDAY

**PARTICIPANTS LIST**

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MAHUDHURIO: KIKAO CHA WADAU MRADI WA TACTIC TAREHE 15/01/2022

UKUMBI WA SAINT DOMINC NYAKAHOJA MUKUYUNI, MIRONGO, NYAMAGANA, LWANHIMA,  
BUGONGWA, BUTIMBA, MBUGANI, MABATINI WARDS

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4	HAMDI S. GABU	MIRONGO	DIWANI	0763740058	
5	CYRIACUS J. KAIGA	IGOMA	MEO	0754417977	
6	Beatrice Benjamin	IGOMA	MEO	0627686716	
7	VUMELIA TIRUFIZA	NYAMAGANA	MEO	0756327686	
8	EVA G. MASUNGA	NYAMAGANA	WEO	0736676410	
9	FLORENCE RUGAZABAMU	NYAMAGANA	ETHO	0786337091	
10	GENOVIVA GASEMBE	LWANHIMA	WEO	0769618713	
11	WINIFRIDA WANTANCHA	MBUGANI	MEO	0752295347	
12	JOYCE SUNGURUMA	MBUGANI UHURU	MEO	0762501071	

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...BONGO

13	SIA GODFREY URASSA	MIRONGO	EHO	0756439624	Ghassa
14	NASSORO HEMEDI	NYAMAGANA	SIWANI	0787 638261	<del>Nassoro</del>
15	KALISI MATHIAS	NYAMAGANA	M/KIT NYAMAGANA MASHARIKI	0683357704	<del>Mathias</del>
16	HABBY K. NDAWI	MBUGANI	CDO	0757729580	<del>Habby</del>
17	Romadhani Khamo	MKUNYUNI	MEU	0754849221	<del>Romadhani</del>
18	HASSAN MAULID	MABATINI	M/KIT NYERERE	0755538680	<del>Hassan</del>
19	ATTUMANI HUSSEIN	MABATINI	M/KIT MBUGANI	0756375922	<del>Attumani</del>
20	STEVEN DANIEL NKAMA	MABATINI	M/KIT NYERERE	0755347242	<del>Steven</del>
21	ALI AMINI IDI ATUMAW	MABATINI	MEU	0765653866	<del>Ali</del>
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23	RITHMA MOTO	MKUNYUNI	F50	9455-495787	<del>Rithma</del>
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25	Adwin J. Maingu	Buhongwa	EHO	0786290177	<del>Adwin</del>
26	Mwajuma OMAR	MKUNYUNI	EHO	0673202838	<del>Mwajuma</del>
27	NEEMA M. STEPHEN	Buhongwa	MEU	0762194487	<del>Neema</del>
28	XIDO M. CHINANGU	INAWANDA	XISA XITA	0768324538	<del>Xido</del>

MTENDAJI V  
KAMIRO

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30	NGOLLO A. MASANTA	MBUGANI	EHO	0762 046886	<del>Handwritten signature</del>
31	HEAVEN P. MAUKI	BUTHONGWA	WEO	0768515504	<del>Handwritten signature</del>
32	FLORA J. SIMON	LWANHIMA	MEO	0753372724	<del>Handwritten signature</del>
33	ZERA A. BUREBE	BUTIMBA	Agri WEO	0784242994	<del>Handwritten signature</del>
34	GUEDELINDE JOHN	BUTIMBA	MEO	0757543270	<del>Handwritten signature</del>
35	ELICIA C MUGORWA	BUTIMBA	CDD	0759714880	<del>Handwritten signature</del>
36	MARY C VALEBIAN	MIRONGO	MEO	0712985257	<del>Handwritten signature</del>
37	SAIMON FULKO	MIRONGO	WEO	0753539339	<del>Handwritten signature</del>
38	SATO W. MHOJA	MIRONGO	MEO	0757358784	<del>Handwritten signature</del>
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50	MARIAM M. MOESA	IGOMA	CDO	0763236820	sub
51	HILDA B. MASSAWE	MABATINI	MEO	0752493340	Frank
52	ABED ALHUSAINI MUSA	BUTUMBA	M/KITI ZIWA	0755056562	All
53	JANETH J. MAROYE	IGOMA	MEO	0763375690	Frank
54	KATHIL EMANUEL	IGOMA	M/KITI MKAPA	0756293000	Abelino
55	RUTH LISHINDI	IGOMA	MHE DIWANI/DU	0754991590	<del>Frank</del>
56	NTABI -B. NTABI	MABATINI	DIWANI	0755-738181	<del>Frank</del>
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58	JOSEPH B. KABADI	BUHONGWA	DIWANI	0786944851	Frank
59	HAMISI R. MNJIA	BUHONGWA	M/KITI MUTI MIREFI	0754399846	Frank
60	ADRIANO JOHN NGODEKI	IGOMA	M/KITI IGOMA KATI	0764333309	Frank

TENDA JI V  
"RO

61	BONPHACE A. MAMWON	IGOMA	M/KITI DR SHEIN	0769341655	
62	MASAI MISINZO	IGOMA	M/KITI SHAMALWA	07AA054571	
63	ADEN ARUTANBULHA	IGOMA	WFO	0717940364	
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67	LEAH T. DEUS	MEUYUNI	CDO	0757859304	
68	MARWA MBUSIRO	BUTUMBA	MH. DIWANI	0755-738181	
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72	RAPHAEL M. SELEJA	MABATINI	M/KITI MIPA MAJENGO MARYA	0767379706	
73	MASUNGA NYAKI	IGWAMBITI & Lwamba	M/KITI MIPA	0765586152	
74	CHUKI HUSSEIN	MBUGANI	M/KITI MIPA	0784808655	
75	GREGORY HURUSA	KISHILI	WFO	0764734691	
76	YUSUFU M. MSABANGI	BUTONGWA	M/KITI	0754839217	

ORODHA YA WADAU WALIOSHIRIKI KATIKA MAJADILIANO KUHUSU UJENZI NA UBORESHAJI WA MIUNDOBIMBU KATIKA JIJI LA MWANZA

STAKEHOLDERS CONSULTATION FOR THE PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT, STAKEHOLDER ENGAGEMENT PLAN, RESETTLEMENT ACTION PLAN, LABOR MANAGEMENT PROCEDURES AND DESIGN DRAWINGS OF THE PROPOSED IMPROVEMENT OF IGOMA - KISHIRI-BUHONGWA ROAD AND MIRONGO RIVER AT MWANZA CITY COUNCIL, MWANZA REGION

TAREHE NA MUDA/ DATE AND TIME: 28/12/2022 SIKU/DAY Wednesday.

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LIST OF STAKEHOLDERS

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6	IPATIA MASORI		MJUMBE	0726513250		[Signature]
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LIST OF STAKEHOLDERS

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13	Rehema Bura		Mjumba	0684200160		[Signature]
14	MWAZABANIS MFAUNG		WAZAZA USAFI	0767021165	1333	[Signature]
15	RUMADHAN HATIBI	MKUMUM KATA	MEO	0625911260	J.L.P 1333	[Signature]
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## **Appendix IV: Resettlement Action Plan**

### **1. INTRODUCTION**

The President's Office, Regional Administration and Local Government (PO-RALG) has received fund from the World Bank to implement the Tanzania Cities Transforming Infrastructure and Competitiveness Project (TACTIC). The project intends to support urban management performance and deliver improved basic infrastructure and services in participating urban local government authorities.

Mwanza City Council (MCC) is among the four (4) beneficiary LGAs under TACTIC Tier 1. The council plans to develop community infrastructures, strategic roads, and drainage system within the town council to contribute in attaining the National Development Vision 2025. These investments are expected to benefit socio-economic development and revenue collection at in MCC. Specifically, the MCC is expected to implement the following project sub-investments: Construction of Igoma Buhongwa road 12 km to bitumen standard; construction of Mkuyuni fish market; and improvement of Mirongo River.

Implementation of these sub-investment projects will affect individuals' private assets including land, buildings/houses and crops. This Resettlement Action Plan (RAP) is prepared to address relocation impacts associated within the proposed projects within MCC. Its preparation is done in accordance with the national laws, World Bank Environment and Social Framework Standards (ESS5) and the TACTIC project's documents including Resettlement Policy Framework (RPF).

#### **1.1 Project Objectives**

The main objective of the proposed subprojects investments is to improve urban transport infrastructures, community services and the storm water drainage in the city. Specifically, the proposed sub-investments have the following objectives:

1. Construction of Igoma-Buhongwa road 12 km to Bitumen standard aims to improve transport, reduce traffic cost and congestion within the city. It also forms part of the ring road that is economically critical for Mwanza city as it links the city to Shinyanga road and Mwanza to Musoma Road.
2. Improvement of Mirongo River aims to remove siltation in the river and reduce unwanted human activities along the river so as to mitigate flooding in the downstream. The city council also intends to beautify the areas along the river banks for recreational purposes and revenue creation from the fees that will be collected.

#### **1.2 Status of the Proposed Project Sites**

The proposed Igoma – Kishiri – Buhongwa Road (14 Km) passes through Igoma and Kishiri wards ending at Buhongwa ward. It forms part of the ring road linking the Mwanza city centre to Shinyanga Road and Mwanza to Musoma Road. It is currently used as a road corridor with various land uses along it such as residential, commercial, utilities like TANESCO poles and water pipes, and peri-urban agriculture. There are also varieties of business activities taking place at the edge of the corridor such as Mama lishe and bodaboda. Rehabilitation of Mirongo River is another subproject proposed for Mwanza City. Mirongo River passes through seven wards of Mkuyuni, Mirongo, Nyamagana, Lwanhima, Mabatini, Mbugani, and Butimba with approximated length of 5.9 Km. Currently, the Mirongo River is used for various human activities including sand mining, discharge of waste water, cleaning of shoes by second hand shoe traders, and car washing.

### **1.3 Rationale and Objective of the RAP**

The proposed construction of Mkuyuni Fish Market in Mwanza MCC will involve permanent land acquisition in some areas which are legally owned by private individuals. A total of 83 individuals owning land, houses and/or trees will be affected. These includes 82 PAPs in Igoma – Buhongwa - Kishiri 14 km road and 1 PAP in Mirongo River. This RAP aims at addressing long-term impacts on PAPs livelihoods, loss of individuals’ income and decline of standard of living that are likely to be triggered by the proposed projects. RAP is also prepared to ensure that, the project sub investments comply with the national laws and the World Bank Environmental and Social Framework Standards (ESS5).

Specifically, RAP is prepared to achieve the following key objectives which also constitutes its scope:

- Put in place Compensation Schedule which will detail affected assets, magnitude of impacts and subsequent entitlements;
- Define the valuation process and methods of compensating impacted assets;
- Identify the consultation approaches to be employed in the RAP process;
- Define the monitoring and evaluation arrangements including Grievance Redress Mechanisms (GRM); and
- Define the institutional and implementation arrangements.

### **2. RAP PREPARATION METHODOLOGY**

The World Bank ESS5 requires for project implementers (Client) to prepare RAP regardless of the number of affected populations. This RAP therefore has been developed in accordance with WB ESF-ESS5 Annex 5: Involuntary Resettlement: 60-64pp. It addresses economic and physical displacement of individual assets along the Igoma – Kishiri – Buhongwa road and the Mirongo river. Diverse methods were employed to prepare RAP such as review of project documents; stakeholders’ consultation meetings; and key informant interviews as well as direct field observations. Asset, census, and socio-economic surveys were also employed to collect baseline information on affected assets along corridor of impact.

### **3. RELEVANT LEGAL FRAMEWORK**

The consultant reviewed all relevant laws related to compensation and construction in Tanzania. The PIU is required to abide to them during execution of different sub investment projects in MCC and during effecting compensation. The following are the legislations and regulations which should be adhered to during project implementation: Environmental Management Act (2004) of the Land Act (No. 4 of 1999) and The Land Act, Cap 113 R.E. 2002, as amended from time to time, Land Acquisition Act (1967) (and its subsequent amendments), Land (Compensation Claims) Regulations, 2001, Land (Assessment of the Value of Land for Compensation) Regulations of 2001, Land (Compensation Claims) Regulations, 2001, The Land Disputes Court Act. 2002 (Act No.2/2002) and The World Bank Environmental and Social Framework (ESS5), Comparison of National Legislation and WB ESS5.

### **4. PUBLIC CONSULTATION AND DISCLOSURE OF INFORMATION**

Consultation of PAPs and other stakeholders formed an essential part in the development of this RAP. It is a requirement of both, the Tanzanian laws and the WB-ESF’ Standards. The latter requires a meaningful, continuous, transparent and communication between the project

implementers, PAPs and other interested stakeholders. Consultations mainly covered PAPs at the project areas and along the proposed road corridors and drainages, local government officers, government agencies, and other interest groups from project areas. In addition, regular meetings were held with MCC and PO-RALG to discuss specific issues that required particular attention in the preparation of RAP.

Disclosure of information and participation of PAPs will continue in the whole period of RAP implementation, monitoring and evaluation of RAP Completion Audit. This will assist in achieving outcomes that are consistent with the requirements of the RAP.

#### **4.1 Stakeholders' Identification**

The identification of stakeholders for this RAP followed the procedures outlined in WB-ESF ESS10, ESS5 and the SEP prepared specifically for TACTIC subprojects investments in MCC. The identified stakeholders included directly affected persons, indirectly affected persons and interested parties. In this regard, the identification of stakeholders under this RAP was based on stakeholder's roles and responsibilities and possible influence/interest of the stakeholder on the proposed sub-project.

#### **4.2 Methods of Stakeholders Engagement**

The stakeholders were engaged by using different technics such as key informant interviews, formal meetings, FGDs, public meetings, and one-on-one meetings. Key informant interviews and discussions were being guided by a checklist of questions and questionnaires. Therefore, a number of regular formal and public meetings were held often as was deemed necessary with the PAPs, government authorities/departments, and other stakeholders to discuss RAP-specific arising issues and procedures. There were separate consultation meetings for the PAPs during the whole period of RAP preparation.

To ensure maximum participation, PAPs including women and vulnerable groups were effectively informed and invited to attend the meeting through village leaders. The village leaders invited their people by using speakers, word of mouth and phone calls. Minutes of meeting were recorded and documented accordingly as guided in the RPF.

#### **4.3 Key Issues Raised By PAPs and Other Stakeholders During Consultation Meetings**

1. ***Economic Benefits to be realized after Completion of Project:*** All consulted stakeholders including the PAPs were in the opinion that the proposed sub-projects investments are vital for socio-economic development of Mwanza City. In particular, many stakeholders pointed out that roads will reduce transport cost, congestion and open-up the project areas for other economic opportunities and foster economic growth for MCC.
2. ***Public Awareness:*** Stakeholders argued the MCC to enhance public awareness and it should be central to the project to avoid unnecessary grievances, conflicts, and misconceptions.
3. ***Compensations of assets that may be affected during construction phase:*** The PAPs were keen to know if the properties that will be affected during excavation works will be compensated and the procedures that will be put in place as in most cases procedures are not clear and the contractors are reluctant to compensate the damages.
4. ***Community Health and Safety:*** During construction phase, the issues of community health and safety should be well considered especially in areas with high population to avoid possible accidents and ill health due to air pollution from dusts generated by construction

works. For instance, at Kishiri area which already has a substantial dust due to vehicle movement.

5. **Access Road:** During construction period, the Contractors has a tendency of closing large sections of the road without providing alternative temporary access roads/divergence roads or providing informative temporary road signs which causes a disturbance to road users.
6. **GBV and sexual harassment:** The experience shows that road project is usually associated with the issues of early pregnancies of young girls, child labor, GBV and sexual harassment. These issues should be well addressed to safeguard our communities.
7. **Project Design:** Roads and associated infrastructures should be of a good quality to prevent premature deteriorations. PAPs at Kishiri area proposed that, in areas where the current road trespasses through private land, the alignment should be changed and follow RoW that was established by MCC during the survey.
8. **Employment of local people:** Local people in the project areas should be considered and given priority in the employment opportunities especially during mobilization and construction phases. Contractors in collaboration with MCC, Ward and Street offices to ensure that hired staff are fairly paid according to provisions of existing legislations.
9. **Natural course of Mirongo River:** Some people residing along the river course diverted the river using instream barriers (stones) which significantly changed the flow and water levels hence caused erosion of the riverbanks and flooding into peoples' residents. Therefore, this project should consider returning the river to its natural flow.
10. **Climate change:** Many areas along Mirongo River experiences floods during rainy season a thing which was not there before. Therefore, the proposed rehabilitation of Mirongo River should also focus in combating this problem.
11. **Commercial buildings:** PAPs wanted to know the compensation procedure for the houses that are used for residential and commercial uses, i.e., the rooms used for commercial will be considered in compensations?
12. **Compensation procedure for deceased properties:** PAPs wanted clarification on who will stand to represent the family during valuation exercise and compensation especially if the deceased didn't write the will.

## **5. ASSET INVENTORY AND VALUATION**

### **5.1 Asset Inventory**

Survey for asset inventory was conducted in May 2022. The consultant Land surveying team, Valuation teams, urban planners from MCC and street leaders worked hand in hand to identify the affected plots and structures within project areas. The land surveying methodology based on the adjudication methods. Where the adjacent PAPs jointly identified the size, area and locations of their common neighbor. Each PAP had to be recognized by his/her surrounding neighbors to claim the ownerships of his/her property unit. The coordinates of the edges /corners of an adjudicated parcel were taken by using handheld GPS. The surveyors recorded the coordinates of each parcel and sketch its geometrical figure.

### **5.2 Marking of the property**

The marking of the properties involved enumeration of each asset and assigning of unique identification number for reference. The reference numbers include details on project type,

location and parcel for example, a plot in Igoma ward is labelled as VAL/COMP/IMC/BSL/001. These numbers are marked on the front wall of the affected structures.

### **5.3 Identification of the owners and other users**

Census and identification of owners of individual assets was conducted. During this census details of the owners' information including names, location contact and their photograph were recorded. And every PAP was assigned a unique reference number. In addition, tenants were also identified and assigned a unique identification number different from that of the owners as they include an additional letter to indicate their status.

### **5.4 Valuation Methods**

Under the existing land laws in Tanzania, land can be acquired by the state for public purposes. The Land Acquisition Act No. 47 of 1967 is the main piece of legislation that governs land acquisition in Tanzania. It is the 'Mother Act' when it comes to land acquisition. The Land Act of 1999 has not amended any of the land acquisition provisions in Land Acquisition Act No. 47. However, the provisos on assessment are elaborated by the Land Act 1999, Part II; Section 3(1) paragraph "g" of the Land Act No.4 and 5 of 1999 which provides:

"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:

- Market value of unexhausted improvements
- Disturbance Allowance
- Transport Allowance
- Loss of Profit
- Accommodation Allowance

#### **5.4.1 Basis of Valuation**

The basic principle governing valuation for compensation is that none of the affected people should be made worse or better off compared to the situation he was in before the land was acquired. The element of compulsory acquisition of land is well treated in most legislation worldwide including Tanzania emphasizing the right to receive a fair compensation to those who occupy land that is subject to acquisition by the State for specific declared objectives.

Decision on what Valuation Methods to adopt was guided by a provision in the Land Act No. 4 of 1999 and Valuation and Valuer Registration Act 2016 which provides for market value as the basis of valuation.

#### **5.4.2 Valuation of Building Improvements**

Guided by the above inquiry, and experience in valuing similar properties in the subject area, the Replacement Cost Method was adopted to arrive at the replacement values of various building units. The Replacement Cost method refers to the cost of re-building similar building/improvements at the date of valuation. This implies rebuilding a similar building to the same standard of workmanship and specifications, design and layout, inclusion of an allowance for professional fees.

### 5.4.3 Land Valuation

Direct Sales Comparison Method was applied to assess the land values. Recent sales of similar parcels of land in the subject area were analyzed and compared with the subject to arrive at the value of the subject sites. The resultant land values were added the improvements value to arrive at property values.

### 5.4.4 Disturbance Allowance

Disturbance Allowance is payable as a percentage of land and buildings value in compliance with the provisions of the Land Act of 1999. It is calculated by charging interest on the value of Land and Buildings by average percentage rate of interest offered by commercial banks on fixed deposits such as the 12 Months fixed deposit at the time of loss land.

Hence:

**Disturbance Allowance = (Land Value + Building Value + Crops Value) x i.**

Where: i. = interest rate offered by commercial banks on 12 Months fixed deposits.

In this valuation, the average rate of 6% per annum was used in calculating disturbance allowance.

### 5.4.5 Accommodation Allowance

According to the Land (Assessment of the Value of Land for Compensation) Regulations, 2001 Accommodation allowance is calculated by considering market rents of affected properties. These are multiplied by 36 months being the duration of constructing another house thus:

$$\text{Accommodation Allowance} = \text{Rent/p.m.} \times 36 \text{ Months.}$$

### 5.4.6 Transport Allowance

Transport allowance is calculated by considering the actual cost of transporting 12 tons of luggage by rail or road (whichever is cheaper) within 20 Kilometers from the point of displacement. i.e.

$$\text{Transport allowance} = 12\text{tons} \times \text{Actual Cost/ton/km} \times 20\text{km}$$

## 5.5 Rates Used in Land Price and Construction Materials per Square Meters

Land value rates was decreased from Main Road business center towards the neighbourhood/locality starting from Tshs. 10,000 per square meters up to Tshs. 8,000 per square meters depending on the location of such land, and ongoing transaction of land of the same location. Building constructed with sand cement block walls and corrugated iron sheets roof coverings material ranges from the rate of Tshs. 300,000-500,000 per square meters depending on quality of finishing and fittings.

## 6. ELIGIBILITY AND ENTITLEMENT

### 6.1 Types of PAPs

As explained earlier, this RAP has identified two major types of PAPs:

- Individual Land Owners which include individuals having crops, trees and structures within the project sites;
- Tenants and workers: PAPs who obtain their livelihood from the affected land/structure/resources.

However, within these groups a third group of PAPs that requires special attention, i.e., Vulnerable PAPs is also found. This includes PAPs with additional and special needs – poor households, people with disabilities, old PAPs, female headed households, children headed households, chronically ill.

## 6.2 Eligibility

All individual PAPs that will be affected by sub-project investments in terms of asset loss, loss of livelihoods, and temporary loss of access to community facilities are eligible for compensation and or assistances. The Tanzania national laws and ESS5 suggest the following types of affected people eligible for compensation and their respective entitlement:

- Those who have formal rights to land (including customary/village land, traditional, and religious rights recognized under Tanzanian law);
- Those who do not have formal legal rights to land at the time when census began, but have a claim to such land or assets, provided that such claims are recognized under the national; and
- Those who have no recognizable legal right or claim to the land they are occupying, using, or obtaining their livelihood from.

From the identified groups, all PAPs who have occupied the land before cut-off date, irrespective of their status will be eligible for some kind of assistance and or compensation. However, people who will encroach the area after the census and valuation are not eligible for compensation or any form of resettlement assistance.

## 6.3 Cut-off Date

As per the Valuation and Valuers Registration Act of 2016, Sect. 53(1&3); a cut-off date is the “date of commencement of valuation” and that “Upon commencement of valuation, a person shall not add or improve anything to the land or such premises”. Under this RAP, a cut-off date was 30th of April 2022. This date was disseminated publicly in the project area whereby all affected persons, Street leaders and other government authorities were informed of this date through community meetings and personal interviews during the onset of asset inventories. Therefore, any person came to the project area after this date is not eligible for compensation or any resettlement assistance.

**Table 1: Compensation Schedules in Mwanza City Council**

<b>A: BUHONGWA-KISHIRI-IGOMA 14 KM ROAD</b>								
<b>NUMBER OF PAPS</b>	<b>LAND VALUE</b>	<b>CROPS</b>	<b>BUILDINGS REPLACEMENT COST</b>	<b>ACCOMMODATION ALLOWANCE</b>	<b>TRANSPORT ALLOWANCE</b>	<b>DISTURBANCE ALLOWANCES</b>	<b>GRAVES</b>	<b>TOTAL COMPENSATION</b>
57	25,682,670	1,725,350	935,845,100	358,920,000	1,650,000	57,795,187	3,900,000	1,385,518,307

<b>B: MWANZA CITY COUNCIL MIRONGO RIVER</b>									
<b>Number of PAPs</b>	<b>Land Value</b>	<b>Crops Value</b>	<b>Septic Tank</b>	<b>Tap</b>	<b>Replacement Cost</b>	<b>Accommodation Allowance</b>	<b>Transport Allowance</b>	<b>Disturbance Allowance</b>	<b>Total Compensation</b>
1			2,000,000	2,000,000	273,844,800	20,160,000	100,000	16,670,688	310,775,488

## **7. LIVELIHOOD AND INCOME RESTORATION PLAN**

In MCC there are no major impacts on livelihood as most of affected assets are residential houses and plots most being partially affected. In this regard, there will be no direct Livelihoods Restoration Programs that will be implemented in the area. However, PAPs will be allowed to salvage construction materials from their buildings and trees remains from their plots. PAPs who are able and willing to work in the project shall be given priority at the construction site.

Additionally, to ensure judicious use of money PAPs will be provided with financial literacy to avoid misuse of compensation fund. The financial literacy will cover issues on:

- Guidance and counseling on investment options.
- Opening bank accounts for PAPs who don't have one;
- Investing in time deposit scheme offered by formal financial institutions. These are reliable instruments for investment with guaranteed returns.
- Purchasing of income generating assets: This can be done by using a part of compensation amount and invest on economic asset such as cattle, farm tools or even take lands on rent if available.

### **7.1 Identification of Vulnerable Groups (VG):**

The identified vulnerable groups will be eligible for additional support to enable smooth relocation and settlement in new areas as recommended by the ESS5. In addition to their compensation amount, the vulnerable groups will receive the following:

An allowance of 20% of the total compensation amount or a lump-sum equivalent to 6months to one year of living subsistence allowance rates provided by TASAF programme (Whichever is higher)

- Enrolment in special livelihood restoration programs
- Logistical support during movement.

## **8. INSTITUTIONAL ARRANGEMENT FOR RAP IMPLEMENTATION AND COMPENSATION**

The following entities will be involved in implementation of this RAP implementation: WBCU Safeguards Unit, Local Government Authorities (Sub-ward and wards), Ministry of Finance, Project Implementation Unit (PIU), District Commissioner, Regional Commissioner, and Chief Government Valuer, The Bank (RAP Paying agent). The preparation of compensation schedule along with PAPS involvement in the whole process will be done by the Council. The WBCU Safeguards Unit will oversee the process. The roles and responsibilities of each involved part is detailed in Table 2.



**Table 2: Institutional Arrangements for RAP Implementation**

Institutions	Description of responsibilities	Remarks
WBCU Safeguards Unit	<ul style="list-style-type: none"> <li>• Oversee RAP implementation through quality control and ensuring that national laws and WB ESF standards are observed.</li> <li>• Ensure that the LGAs have done meaningful stakeholders Consultation</li> <li>• Identifying training needs of all parties involved in RAP implementation.</li> </ul>	<ul style="list-style-type: none"> <li>• To be supplied with RAP document.</li> <li>• To be supplied with stakeholders' consultation reports (evidence)</li> </ul>
Sub-ward/Streets Local Governments	<ul style="list-style-type: none"> <li>• To participate in stakeholders' consultation meetings</li> <li>• To participate in asset inventory and census,</li> <li>• To sign compensation schedules</li> <li>• To participate in identification of missing PAPs</li> <li>• Identification of relocation sites</li> <li>• To participate in grievance management.</li> </ul>	<ul style="list-style-type: none"> <li>• To be integrated throughout the project cycle</li> <li>• To commence consultations prior to project start</li> </ul>
Ministry of Finance	<ul style="list-style-type: none"> <li>• Approve and disburse to LGAs the requested compensation funds</li> </ul>	<p>The MoF is the highest government structure to approve for utilization of the public funds. Thus, it has a lead role in decision making.</p>
Local Government Authorities	<ul style="list-style-type: none"> <li>• Ensure compliance to the WB safeguard standards and Got rules and procedures</li> <li>• To work with consultant in preparation of sub project design and drawing</li> <li>• Undertaking stakeholders' consultation with relevant PAPs</li> <li>• Ensure PAPs needs and concerns are integrated</li> <li>• To identify corridor of impacts and owners of different assets along way leave</li> <li>• Prepare compensation schedules</li> <li>• Agreement with PAPs about expropriation.</li> <li>• Publication of the notice for the expropriation – declamation</li> <li>• Grievance management</li> <li>• Submit compensation schedules to relevant approval organs.</li> <li>• Identification of special groups and determine the required assistances</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure fair evaluation of the properties</li> <li>• The procedure must be followed carefully and respecting the right of the third persons to prevent the complaint to the Court</li> <li>• The expropriation will be done for the persons who will accept to be compensated with the conditions published.</li> <li>• Ensure that compensation is done with respect (amount and time) of agreements signed by interested parties and before starting the project implementation</li> </ul>

Institutions	Description of responsibilities	Remarks
	<ul style="list-style-type: none"> <li>• Make due compensation to PAPs before civil works begin in coordination PO-RALG and WBCU</li> <li>• Information sharing to all eligible PAP regarding compensation amount and size of land offered for compensation before effecting of cash payment or land compensation</li> <li>• Sign the compensation agreements and issuance of PAP ID cards</li> <li>• Help in the identification of alternative land for those PAPs displaced from within the way leave</li> <li>• Monitoring and evaluation</li> <li>• Contribute to the GRM by designating members to the committees</li> </ul>	
PAPs	<ul style="list-style-type: none"> <li>• Participate in consultation meetings</li> <li>• To participate in asset inventory and valuation exercise</li> <li>• To participate in choosing restoration sites and livelihoods restoration programs</li> <li>• Opening a Bank Account</li> <li>• To vacate the site after compensation</li> </ul>	The PIU to coordinate
PIU	<ul style="list-style-type: none"> <li>• Spearhead RAP preparation and implementation process</li> <li>• Ensure that they work closely with PAPs</li> <li>• Formulate GRM and communicate it to the PAPs</li> <li>• Formulate Resettlement Committee</li> <li>• Participate on Monitoring and evaluation</li> <li>• Participate in Grievance management</li> <li>• To implement SEP</li> <li>• Arrange and coordinate PAPs financial literacy awareness</li> </ul>	
Design consultants and LGA engineers	<ul style="list-style-type: none"> <li>• Providing designs to the RAP development team including explanations of the critical section that may require additional PAPs</li> </ul>	coordinating with the RAP team to make sure the two processes are well aligned to(i) ensure that resettlement impacts are minimized at an early stage, (ii) ensure that designs reflect the findings of the RAP and stakeholder inputs.

Institutions	Description of responsibilities	Remarks
District Commissioner	<ul style="list-style-type: none"> <li>• To oversee RAP implementation</li> <li>• To endorse compensation schedules</li> <li>• To participate in GRM</li> </ul>	To be supplied with compensation schedules on time.
Regional Commissioner	<ul style="list-style-type: none"> <li>• To oversee RAP implementation</li> <li>• To endorse compensation schedules</li> <li>• To participate in GRM</li> </ul>	To be supplied with compensation schedules on time
Chief Government Valuer	<ul style="list-style-type: none"> <li>• To assess and endorse compensation schedules</li> </ul>	To be supplied with compensation schedules on time
Land Resources and urban Planning Department	<ul style="list-style-type: none"> <li>• Identifying and verifying property boundaries and ownership</li> <li>• Consistence of the proposed projects with urban planning</li> </ul>	<p>To be supplied with project designs</p> <p>To be involved in valuation exercise</p>
The Bank (RAP Paying agent)	<ul style="list-style-type: none"> <li>• Train PAPs on their financial services and management of compensation money</li> <li>• Ensuring PAPs are paid timely and in accordance to the payment schedule</li> <li>• Confirm eligibility of PAPs for compensation on the basis of his/her national identity card, driving license, or passport</li> <li>• Notify the PIU when payment has been done and proof of PAPs payments and their photographs</li> </ul>	To be provided with payment schedule
Contractor	<ul style="list-style-type: none"> <li>• Provide to PIU the final schedule of construction to be communicated to the communities in the wayleave and project areas</li> <li>• List and communicate all possible obstruction sections.</li> <li>• Prepare Site Specific Environmental and Social Management Plans</li> <li>• Provide labor requirements and consider employing local population and pay wages as per applicable norms</li> <li>• Compensate for any damages to assets outside of wayleave, in accordance with rates established in the and final RAP.</li> <li>• Traffic management during construction</li> <li>• Observe grievance redress procedures for construction-related impacts</li> </ul>	To observe ESIA, RPF, and RAP

Institutions	Description of responsibilities	Remarks
	<ul style="list-style-type: none"> <li>Implement codes of ethical conduct to protect local population and contractor’s workers against spread of HIV/AIDs, STDs, GBV and COVID-19.</li> </ul>	

### 8.1 RAP Implementation Committee

To implement this RAP, Consultant propose three committees:

- Resettlement Committee: This will constitute of PIU Coordinator, Representatives from the Ministry of Land and Housing and Human Settlement Development, Representative of District Commissioner, Municipal Valuer, Representative of street/ward office, RAP Consultant, paying agent (Bank), and Representative of PAPs.
- Compensation Committee: This will involve Representative of District Commissioner (Chair), Representative of Principal secretary of PO-RALG, Independent lawyer from recognised NGOs, RAP Consultant, payment agent, Valuator, and Representative of PAPs.
- District Grievances Redress Committee: Municipal Director (Chair), Representative of Ministry of Lands/chief valuator, Valuator, Representative from PO-RALG, Street leader, Facility grievance committee chair, Representative of PAPs, and Representative of a local NGOs.

## 9. RAP IMPLEMENTATION ACTIVITIES AND SCHEDULE

This section presents the RAP implementation activities and schedule to be followed as detailed below:

### 9.1 Necessary Activities for RAP Implementation

The necessary activities for implementation are grouped into three phases: preparations for compensations; activities prior to construction works; and activities for the completion of RAP.

A. Preparations for compensations:

- To ensure a smooth and appropriate compensation exercise, the Council through PIU will have to undertake these activities:
- Disclosure of the RAP document with subsequent instituting of RAP implementation committees, Grievance Management Committees.
- Stakeholder’s familiarization and operationalization of the GRM and RAP. This will be done through workshops to be organized by the PIU in collaboration with the RAP consultant.
- Arrangement and finalization of contracts with RAP implementation supporting agencies. This includes the bank responsible for disbursement of compensations as well the financial education agency; the contractor who will be responsible for construction of replacement houses in case of replacements in kind; and consultant for RAP implementation.
- Disclosure of compensation amount to the individual PAPs and signing of compensation agreements forms. In addition, PAPs will be given a final chance to confirm their selected

mode of payments. Any change will be updated in RAP database and shared to the payment agent and construction contractor.

- Provision of financial education to PAPs. This will be organized by the PIU in collaboration with the resettlement and compensation committees and procured financial agent. The PAPs will be required to open Bank Account or present their bank details, and issued with identity cards.

**B. Activities to be completed before the beginning of construction works**

Conduction of additional Outreach Activities such as posters, radio programs. Additionally, some streets meetings will be held to counsel PAPs and inform them on the compensation processes, RAP implementation and expected dates for the beginning of construction works.

Payment of compensation, Provision of notices to PAPs on duration to vacate the project sites and subsequent vacation of land: The payment agent will affect compensations to PAPs. During this exercise, the payment agent will have to confirm eligibility of PAPs through checking of PAPs IDs or government IDs (NIDA). Selection of modes of monetary payment will be based on the compensation thresholds indicated in Table 3.

**Table 3: Payment Modes by Threshold Amounts**

Amounts payable (in Tanzanian TZS)	Payment Modes/Options
Below 200,000	Cash
200,000 to 500,000	Cheque
Over 500000 to 2,000000	Cheque or bank account
Above 2,000000	Only bank

Handover of vacated site to contractor: Once all properties on the wayleaves and project areas are vacated, the site will be handed over to constructor ready for commencement of civil works.

**9.2 RAP Implementation Schedule**

This RAP will be implemented in 14 months. Table 4 summarizes the month-wise activity schedule.

Table 4: RAP Implementation Schedule for TACTIC sub-projects in Mwanza City Council

S.NO.	ACTIVITY	MONTHS													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Activities for the Preparations for Compensations															
	Disclosure of the RAP document														
	Creation of RAP implementation committees, Grievance Management Committees														
	Familiarization and														

S.NO.	ACTIVITY	MONTHS														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
	operationalization of the GRM and RAP															
	Arrangement and finalization of contracts with RAP implementation supporting agencies															
	Disclosure of compensation amount to the individual PAPs, signing of compensation agreements forms and confirmation of mode of payments															
	Procurement of financial expert and provision of financial education to PAPs															
	PAPs opening of Bank accounts or provision of account details															
	Creation of Livelihoods Restoration Committee (LRC)															
Activities to be completed before the beginning of construction Works																
	Procurement of training professionals and conduction of livelihood restoration trainings															
	Conduction of															

S.NO.	ACTIVITY	MONTHS													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
	outreach activities and streets counselling meetings														
xi	Payment of compensation and vacation of land														
Xii	Handover of vacated sites to contractors														
Activities for Completion of RAP															
Xiii	Preparation of Periodic Internal Monitoring Reports														
Xiv	Annual Project Review Workshop														
Xv	Preparation of RAP Implementation Completion Audit														
Xvi	Submission of RAP Implementation Completion Report														

## 10. GRIEVANCE REDRESS MECHANISM

TACTIC project in Mwanza City Council will use the existing grievance resolution procedures through local government system i.e., grievance resolution through negotiation and mediation at local government offices and through existing laws (court of law). All PAPs will be informed on the existence of a Grievance Redress Mechanism (GRM). These will include information on accessibility of the GRM; the procedures involved in logging of grievances; and the right and procedures to appeal if not satisfied with the resolution made. This information will be provided through respective “Street” leaders and awareness meetings that will be held during the preparation of the detailed RAP

### 10.1 Grievance Resolution through Negotiation and Mediation

This grievance procedure is simple and administered at the local level to facilitate accessibility, flexibility, cost effectiveness, transparency to various proofs and timely settlement of the grievances. Under this system, the aggrieved PAPs can log their complaints by either reporting the matter directly to the “Street” offices (usually verbally) or to the subproject’s grievance

redress committee. If reported to the Street office, the chairperson will record the complaint in the grievance log book, and the matter is referred to the “Street” advisory committee for resolution. Depending on the matter, the “Street” chairperson will also notify Ward Office and/or Councilor.

Alternatively, if the aggrieved PAPs can log their complaints by reporting the matter directly to the subproject’s grievance redress committee or at PIU office in Mwanza City Council, he/she will fill special grievance forms. The subproject’s grievance committee members will consist of the members from relevant District functional department (i.e., Land Office/Valuer in case of land disputes), Ward and “Street” offices, and a representative of the complainant and the perpetrator. The committee will consult the lower local government levels and other records to determine the validity of claims. If claims are valid, the committee will recommend appropriate remedial measures and or compensation. The GRC through “Street” office will notify the complainant on the recommended settlement.

### **10.2 Time Frame for Negotiation and Mediation**

Under negotiation and mediation procedure, the time frame for grievance resolution will be as follows;

- Grievance committee will acknowledge receipt of a grievance in writings within five (5) business days from the day complaint was reported.
- Within ten (10) days of receipt of the grievance, grievance committee will conduct the investigation and provide a response to the complainant.
- The resolution of the grievance through negotiation method shall be reached within twenty (20) days of receipt of the grievance.

### **10.3 Disputes Procedures under Existing Laws**

If the PAP is not satisfied with decisions of the GRC, the aggrieved party is obliged to take the matter to the court as specified in the Tanzania Land Acquisition Act 1967. The matter will be filed to the local courts and/or the Land Tribunals whereby if not settled; the matter will be referred to the High Court for resolution. The High Court of Tanzania and Court of Appeal is the highest appellate “judge” in this system and its decision would be final.

The procedures for compensation dispute resolution prescribed by the Land Acts are cumbersome and costly, taking into account the fact that most of the PAPs have limited knowledge about legal issues and their rights with respect to the laws. Thus, all grievances should be amicably resolved before a decision to go to court is undertaken by the PAP.

## **11. RAP COST AND BUDGETING**

This RAP budget is prepared in order to carefully assess and estimate costs to be incurred during implementation. In this RAP, quantities and unit costs per item are based on magnitudes of displacement-related impacts as well as on the eligibility considerations and entitlement matrix outlined in Chapter 6. Therefore, this budget has been prepared based on the valuation survey as of May, 2022.

The budget took into account the costs of compensation for loss of land, structures and crops; and their associated allowances (accommodation, loss of profit, transport and disturbance allowances). The budget also included special assistance to the vulnerable groups, management and administration costs, contingencies, costs for consultancy services (hired service providers for implementing RAP activities); and monitoring and evaluation costs by internal implementing teams (PIU) and external monitors as they are not yet identified.



Based on the above items, the RAP implementation cost is calculated as Tanzania Shillings; two billion eighty-eight million seven thousand seven hundred seventy-seven and sixty-four hundredths (2,088,007,777.64) as detailed in table 5.

**Table 5: Itemized compensation budget**

S/N	Item	Cost (Tzs)	Quantity (Affected Assets)	Source of Fund	Channel of Disbursement	Timing
1	Compensation of Land	25682670	2,853.63 m2	Annual Council's budgets approved through parliament.	MCC	November 2022- January, 2023
2	Compensation of Buildings and fence /Structures	1,274,431,450	55	Annual Council's budgets approved through parliament.	MCC	November 2022- January, 2023
3	Compensation of Crops and tres	2,113,950.00	106	Annual Council's budgets approved through parliament.	MCC	November 2022- January, 2023
4	Compensation fence	8,160,000.00	1	Annual Council's budgets approved through parliament.	MCC	November 2022- January, 2023
5	Compensation grave	3,900,000.00	3	Annual Council's budgets approved through parliament.	MCC	November 2022- January, 2023

6	Accommodation, transport, and disturbance allowances	477,993,284.20	5	Annual Council's budgets approved through parliament.	MCC	November 2022-January, 2023
<b>Sub-Total</b>		<b>1,792,281,354.20</b>				
7	Management /administration monitoring & evaluation assistance (15% of total compensation cost)	268,842,203.13	NA	Annual Council's budgets approved through parliament.	MCC	November 2022-January, 2023
8	Contingency (10% of Management /administration cost)	26,884,220.31	NA		MCC	November 2022-January, 2023
<b>Sub-Total</b>		<b>295,726,423.44</b>				
<b>Total RAP Budget</b>		<b>2,088,007,777.64</b>				

### 11.1 Funding Sources

Funding to be processed and effected through the project's financial processing arrangements. Funds for implementing inventory assessments and resettlement plans to be provided by the implementing agency (LGAs). The funds to be obtained from annual Council budgets approved through parliament; Local taxes and levies collected in the LGA and /or Loans from commercial Banks.

### 12. MONITORING AND EVALUATION

TACTIC Coordination Unit in Mwanza City Council will be responsible for the M&E of implementation for the resettlement/compensation plans at Municipal level.

Once this RAPs have implemented, a final review is required in order to assure that the plans have been properly implemented- resettlement and compensation final report (RFR). The M&E objective will be to make a final evaluation to determine:

- If PAPs have been compensated in full before implementation of subproject activities; and
- If PAPs are now living at a higher standard than before subproject implementation, living at the same standard, or if they are poorer.

#### 12.1 General Objectives of Monitoring and Evaluation

RAP implementation monitoring is critical to solve challenges in the areas of mobilization, compensation, relocation grievance redress etc. While process monitoring will enable the council to assess whether due process is being followed, performance monitoring will mainly relate to achievement in measurable terms against the set targets. Mwanza City Council will monitor performance of this RAP which shall cover aspects such as staff involved RAP implementation, timeliness of implementation of proposed activities and various indicators and benchmarks. Internal monitoring of process and output indicators by TACTIC Coordination Unit in Mwanza City Council and the TACTIC coordination Unit at PO-RALG. External monitoring by an independent monitoring agency or an independent consultant to check the extent to which resettlement and rehabilitation objectives have been met is also recommended.

### **12.2 Internal Monitoring**

Internal monitoring should involve the concurrent checking of implementation activities to ascertain whether these activities are being implemented in accordance with the approved RAP and thereby enable the LGA to take appropriate action to address any gaps, deviations, etc. and ensure timely delivery of compensation and resolution of matter of concerns for PAPs and other stakeholders. The subproject's management unit and supervising consultant will be responsible for internal monitoring and share RAP implementation progress and periodic monitoring reports with PO-RALG TACTIC Coordination Unit and the World Bank. The census of PAPs and inventory of losses will constitute a base line for monitoring of RAP progress and at subproject supervision level. Specific monitoring topics for the internal monitoring will be:

- Information on consultation with PAPs;
- Status of land acquisition and payments on land compensation;
- Compensation payment progress for affected structures and other assets;
- Payments for loss of income according to the details provided in the RAP;
- Income restoration activities;
- Supplemental compensation for unforeseen losses;
- Relocation of PAPs;
- Grievance management.

### **12.3 Indicators for M&E**

A number of socioeconomic indicators to be used to determine the status of affected people which includes: Comparison to pre-project, land being used, standard of house, and level of participation in project activities, how many children in school, health standards, and others. These indicators aim at achieving three major socioeconomic goals by which to evaluate subproject's success:

Affected individuals, households, and communities are able to maintain their subproject standard of living, and even improve on it;

- Local communities remain supportive of the project; and
- Absence or prevalence of conflicts.

The indicators in Table 6 below will be used to monitor and evaluate the implementation of resettlement and compensation plans.

**Table 6: Indicators for internal monitoring**

Parameters	Indicators	Timeline
Institutional set-up and strengthening	RAP implementation and monitoring institutional set-up is in place.	Monthly
	Budgeted RAP costs released and placed at disposal of land acquisition and resettlement implementation entities.	Monthly
	Number of trainings provided to the committees (GRCs)	Monthly and quarterly
	Grievance redress mechanism established and explained to the PAPs and affected communities	Monthly
Delivery of PAPs' Entitlements affected assets and livelihoods	Number of Affected assets compensated (based on category of losses set out in the entitlement matrix).	Quarterly, annually
	Number of replaced trees and structures	Quarterly, annually
	Number of restored livelihoods and income including transitional support provided	Quarterly, annually
	Social infrastructure and services restored as and where required.	
Financial (compensation/ establishment)	Amount of total compensation disbursed	End Term Evaluation
	Amount of compensation paid to PAPs by LGA, Location (sub-ward)	End Term Evaluation
	Number of PAPs paid compensation (disaggregated by gender) in cash/cheque/bank account	End Term Evaluation
	Number of PAPs already having bank accounts and those yet to open	End Term Evaluation
	Number of PAPs who were not found and not paid	End Term Evaluation
Restoration of living standards and income	Number of residential structures reconstructed/ restored at relocation sites outside RoW limits.	Quarterly
	Number business structures (shops/stalls) constructed/relocated outside RoW limits and business/income activity restored.	Quarterly
	Number of PAPs who shifted to other unaffected parcels by area	Quarterly
	Number of PAPs who continue to reside in the same areas as before	Quarterly
	Number and percentage of displaced peoples covered under livelihood restoration and rehabilitation programs (youths, women, and vulnerable groups).	
	Number of total PAPs enrolled into ongoing government programs (by type)	Quarterly
	Number of No of PAPs including vulnerable groups (youths and women) employed in construction works by type of services provided	Quarterly

Parameters	Indicators	Timeline
	Number of emerging PAPs due to unforeseen construction impacts	Monthly
	Number of Encroachers existing within the compensated corridor	Monthly
	Number of Consultations meetings held with communities	Quarterly, Midterm and End Term
	Time taken for issuance of expropriation order and date of vacating the land	Quarterly, Midterm and End Term
	Time taken to identify alternate lands for PAPs	Quarterly, Midterm and End Term
	Number of displaced peoples who have successfully restored their income and livelihood patterns (youths, women, and vulnerable groups).	Quarterly, Midterm and End Term
Compensation usage	Number of men and women built new homes to replace the demolished/impacted ones	Midterm and End
	Number of men and women planted trees to replace the lost ones	Midterm and End
	Number of men and women built new homes to replace the demolished/impacted ones	Midterm and End

#### 12.4 Reporting

Apart from periodical progress reports that will be submitted by the consultant on monthly and quarterly basis, there should be two essential monitoring reports to be produced by RAP implementers:

- A Resettlement and Compensation Monitoring Report (RMR) to be prepared by the M&E consultant at the end of the assignment.
- Resettlement and Compensation Final Report (RFR) to be prepared by the RAP implementation Agency and be approved by the client.

## Appendix V: Health and Safety Plan

### 1.0 Introduction

Health Safety Management Plan (HSMP) helps in implementation, maintaining and continually improve Health and Safety management system in accordance with the requirements of Occupational Health and Safety Assessment Series (OHSAS) standards. It is therefore important that this is reflected in the operations and responsibilities of every level of management within an organization. This plan shall help to implement the Safety and Health direction of Igoma-Buhongwa road and Mirongo river. It clearly states the requirements of donors, legislations, suppliers, management and employees in Safety and Health management.

### 1.1 Health and Safety Policy Statement

The management acknowledges that, the activities will have the potential to harm employees, customers and all other people who will be into contact with directly or indirectly. We firmly believe that all people will have the right to live and work in a safe environment that is not detrimental to their health and safety during the execution of the activities.

### 1.2 Purpose

The purpose of this Health and Safety Management plan for construction of Igoma-Kishiri-Buhongwa road and Mirongo river is to provide an overview of the contractor Management System that enables its health and safety policies and business objectives to be achieved by successfully performing the project work in compliance with donor requirements as well as the legal requirements of United Republic of the Tanzania. This plan shall define the execution strategy and methodologies for implementation to achieve the aforementioned purpose. Project shall in undertaking the works, aspire to:

- Achieve zero fatalities, zero permanent disabilities and improve safety performance year on year through
- Complying with all current Health and Safety Legislation and approved Codes of Practice
- Ensuring compliance with Contractors' and donor safety requirements and publish these as part of the Project requirements
- Project shall in aspiration provide a Safe and Health Working Environment for its employees

This HSMP shall be implemented in alongside site-specific Environmental and Social Management Plan (ESMP) as submitted to Employer.

### 1.3 Scope

This HSMP will be applicable to the construction project of the road and Mirongo river and other relevant stakeholders including Mwanza City Council as Client of the Project and the Contractor while in the course of duties associated with the Project.

#### Definitions

**Table 1.1:** Definitions to be used by contractor on the construction of the Igoma - Buhongwa road and Mirongo river at Mwanza City Council

Client	Mwanza City Council
Corporate	Generic term used to refer to the corporate level of management.
Employee	An employee is any person directly employed by a contractor, whether on an agency, limited Client, temporary, permanent staff, part time or full-time basis.
Environmental incident	An "Impact" which results in the accidental emission or discharge of a substance, categorised as harmful, to the environment.
Hazard	The potential for human injury or loss of life, damage to the environment or to material assets or a combination of these.

High Potential near miss (Hi-Po)	A near miss where the potential consequences could have resulted in a high-risk incident. The potential consequences are those that could reasonably be expected if one further barrier had failed, e.g., if a fall arrestor had not functioned or a different position of an individual could have resulted in a more serious injury.
Incident	Term to define an unplanned event or chain of events that results in harm to people, damage to property or the environment, loss of process.
Likelihood	Indicates the possibility of something to happen
Lost Workdays	Number of days where an employee could not return to work due to a work-related injury. No of LTI's X number of day's persons absent.
Lost Time Injury Frequency Rate (LTIFR)	The frequency of lost time injuries per 1,000 000 hours worked/at risk. $LTIFR = \frac{(\# \text{ of F} + \# \text{ of LTI}) \times 1,000,000}{\text{manhours worked}}$ <p>where F is the Fatality, LTI is the Lost Time Injury/Illness</p>
Lost Time Injury/Illness (LTI)	Work related occurrences, or related to the wider activities that resulted in a fatality, permanent disability or the person being incapable of performing any work on one day/shift or more, on any calendar day subsequent to the day of the occurrence occurring or the illness being identified.  Due to inconsistencies of the medical profession in granting time off to a patient, contractor "may" challenge the decision of a medical practitioner if it is considered the medical practitioner has been overzealous in granting time off. Fatalities arising from suicide, inexplicable personal behavior or natural causes shall be excluded.
Medical Treatment Case (MTC)	Is a work-related injury or illness that requires treatment from a qualified medical practitioner (Note: if the treatment was given by a qualified medical practitioner but could have been performed by someone less qualified the category will be first aid case). They must be treated only by physician or licensed medical personnel if the injury or illness is of a nature where: They impair bodily function (i.e., normal use of senses, limbs, etc.): They result in damage to the physical structure of a non- superficial nature (e.g., fractures); or They involve complications requiring follow-up medical treatment. Physicians or registered medical professionals, working under the standing orders of a physician, routinely treat minor injuries. Such treatment constitutes first aid. In addition, some visits to a doctor do not involve treatment at all. For example, a visit to a doctor for an examination or other diagnostic procedure to determine whether the employee has an injury does not constitute medical treatment. Conversely, medical treatment can be provided to employees by laypersons; i.e., someone other than physician or registered medical personnel. The following are generally considered medical treatment. Work-related injuries for which this type of treatment was provided or should have been provided are almost always recordable: Treatment of infection Application of antiseptic during second or subsequent visit to medical personnel Use of prescription medications (Except a single dose administered on first visit for minor injury) Application of hot or cold compress(es) during second or subsequent visit to medical personnel Cutting away dead skin (Surgical debridement).

	<p>Use of whirlpool bath therapy during second or subsequent visit to medical personnel.</p> <p>Admission to a hospital or equivalent medical facility for treatment.</p> <p>Medical treatment does not include first aid treatment even though provided by physician or registered professional personnel. If you have already counted the case as a lost workday or restricted workday case, do not count the case as a medical treatment case. This category is for cases in which medical attention (beyond first aid) is administered and the employee returns to his or her regular duties for the next scheduled shift.</p>
Near Miss	<p>Incidents, which, strictly by chance, do not result in actual or observable injury, illness, death, or property damage. These are measured by their potential rather than actual outcome.</p>
Occupational illness and disease	<p>An abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. It includes acute and chronic illness or diseases that may be caused by inhalation, absorption, ingestion or direct contact. Chronic conditions should be reported once in the period during which the condition was first diagnosed.</p> <p>Injuries are caused by instantaneous identifiable events in the working environment. Illnesses are caused by anything other than identifiable instantaneous events e.g. if repeated or prolonged exposure is involved the outcome is considered an illness. Additionally, a judgment needs to be made as to whether or not this exposure was work-related.</p>
Occupational injuries and illness examples	<p>General:</p> <ul style="list-style-type: none"> <li>Death (If work related)</li> <li>Injury sufficient to require medical treatment</li> <li>Loss of consciousness</li> <li>Restriction of work or motion</li> <li>Transfer to another job</li> <li>Significant injury or illness diagnosed by a physician or other licensed health professional, such as;</li> <li>Cancer (If work related)</li> <li>Chronic irreversible disease (If work related)</li> <li>Fractured or cracked bone, or</li> <li>Punctured eardrum</li> <li>Food poisoning</li> <li>Epidemic disease</li> </ul> <p>Specific:</p> <ul style="list-style-type: none"> <li>Needle sticks and cuts from sharp objects that are contaminated with another person's blood or other potentially infectious material</li> <li>Occupational hearing loss (current hearing test must show 10dBA shift from current baseline and total cumulative hearing loss must be 25 dBA or move above audiometric zero)</li> </ul>
Property damage	<p>Incidents that damage to property (contractor and/or third party). All incidents shall however be reported.</p>
Recordable case	<p>Recordable cases are the sum of the number of Fatalities, Lost Time Injuries, Restricted Work Cases and Medical Treatment Cases.</p> <p>Guidance note:</p> <p>Where contractor supplies resources to a customer and the control of management does not rest with contractor, this is deemed not to be recordable and all related data associated with any incident; (injuries, illness, environment, property damage and vehicle) will not be collected and maintained. However, where these resources</p>



	are provided to a customer, contractor shall make all reasonable endeavours to ensure that effective HSE measures and arrangements are in place to ensure the health and safety of contractor personnel.
Restricted Work Case (RWC)	Is a work-related injury or illness which results in the person being incapable of performing the full range of their normal duties on any day/shift subsequent to the day of the injury occurring or the illness being identified, but is capable and has been assigned to “other” duties.
Risk	A combination of the likelihood of a hazardous event and the severity of the possible consequences of that hazardous event.
Road traffic incident	A work-related incident that takes place on any road (public or private) which results in damage to a project vehicle and/or a vehicle used in the execution of contractor business. Where damage to the vehicle is such that it has to be taken out of service “immediately” for repair and/or causes any injury to any person and/or damage to a third party. Incidents taking place within fenced yards or similar areas shall normally be treated as property damage. Note: In the event of an injury to contractor/subcontractor personnel arising from a road traffic incident, these injuries shall also be reported in their respective categories i.e. Lost Time Incident.
Road Traffic Incident Rate	The number of vehicle incidents per one million kilometres driven. $\frac{\text{No of Road traffic incidents} \times 1,000,000}{\text{No of KM driven}}$
Subcontractor	Any company that has been contracted by the contractor to provide work and/or services.
Worked man-hours	The total number of hours of direct working activities within the project site boundaries, including paid overtime and training, but excluding leave, sickness and other absences.
Work related	Work relationship is established when the incident/injury/illness results from an event or exposure in the work environment. The work environment consists of: “Project premises” and other locations where employees/contractors are engaged in work related activities or are present as a condition of their employment. Travel on contractor business is considered work related, but this is limited to journeys where transport and/or purchase of airline, rail, and sea tickets have been provided by contractor. A hotel while being used on contractor business as a place of abode (sleeping, eating) shall be considered as “home” and any incident arising from this is not work related. Travel between home and work is not work related, unless the transport provided is provided by contractor. Injuries or illnesses that occur to employees or contractors while participating in voluntary activities (i.e., those that are provided or made possible by contractor but in which participation is voluntary and for personal benefit such as fitness facilities) shall not be considered work related. Unless the injury/illness was as result of the provision of faulty materials/equipment or unsafe premises by contractor.

## 2.0 PLANNING

### 2.1 HAZARD & RISK MANAGEMENT

Contractor shall establish and maintain procedures for the ongoing identification of hazards, assessment of risks and the implementation of necessary control measures to construction of roads and Mirongo river. These include:

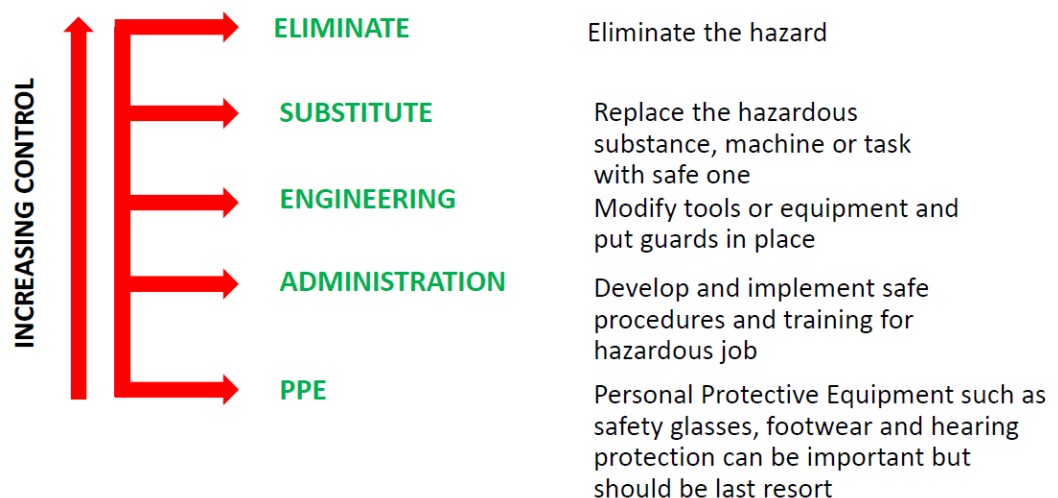
- i. Routine and non-routine activities.
- ii. Activities of all personnel having access to the workplace (including all visitors).
- iii. Activities on site, whether provided by contractor or others.
- iv. Contractor will ensure that the results of these assessments and the effects of these controls are considered when setting its OH&S objectives. The contractors shall continue to keep document and other information up to date.
- v. Contractor believes that effective planning is a cornerstone of HSMP improvement, which performs assessment of legal requirements and the hazards of the project that can influence HSMP performance.
- vi. Before undertaking any hazardous job, Contractor will ensure:
- vii. Complete hazard analysis, this can be either a Risk Assessment or Job Safety Analysis depending on Client requirements.
- viii. Ensure that all work permits required for performing the work is available as required.
- ix. Before starting works all workers should attend toolbox talk
  - x. All personnel involved are aware of the hazards and control actions.
  - xi. Ensure the job is adequately supervised.
- xii. A risk register will be maintained on site and will be a live document. This document will be reviewed on annual basis by Project Risk Assessment Teams and approved by Project Manager to ensure all risk assessments have been incorporated. This document if applicable may be submitted for approval to the Client prior to work commencing.

### 2.1.1 Risk Assessment

Contractor is committed for controlling and managing risk through a process of identifying hazards, assessing their likelihood and severity, analyzing the cause and implementing control measures. The risk management process involves the development of the appropriate controls and reduction measures for each hazard.

The degree of risk control required is dependent upon the level of risk for each hazard. The methods of control are implemented using a hierarchy as follows:

### HIERARCHY OF CONTROL



### 2.1.2 Risk Register

The project risk register should list all types of hazards (physical, chemical, biological, ergonomic) identified for the type of activities present during the works.

Its purpose is to provide a system that will enable the project to identify and review hazards, assess potential risks and implement appropriate control measures.

The risk register is used as a database to record data obtained from several sources that deal with potential hazards.

The risk register, which will be kept by the business unit, will be progressively developed and initially contain where applicable the (HIP/HAZCON/SIMOPS) review listing of hazards. A duplicate risk register will be kept by project EHS team that includes all the risk assessments carried out.

### **2.1.3 Job Safety Analysis**

Job safety analysis, commonly known as JSA, is a process used to determine hazards arising from and safe procedures for each specific step of a job.

JSA is used to assist in planning the safety of a job before it starts.

A specific job or work assignment can be broken down into a series of relatively simple steps; the hazards associated with each step can be identified, and solutions (treatment options) can be developed to control each hazard.

Where appropriate, either a RA or JSA will be developed independently or as part of work method statements

### **2.1.4 Simultaneous Operations**

Where applicable, Simultaneous Operations (SIMOPS) studies will be carried out if there is scope for interaction to occur between major hazardous activities, and the design and construction intent is to carry out these activities concurrently.

The purpose of these studies is:

- (1) To identify the additional levels of risk introduced by simultaneous operations
- (2) To assess the acceptability of additional risks and to identify risk reduction methods

Findings and recommendations from the SIMOPS studies will be used to develop the simultaneous operations procedures.

### **2.1.5 Safe Work Instructions**

Contractor is committed to control and manage risk through a process of identifying hazards, assessing their likelihood and consequence, analyzing the cause and implementing control measures.

To assist this process and for use on common activities a series of safe work instructions shall be develop to be use on the project.

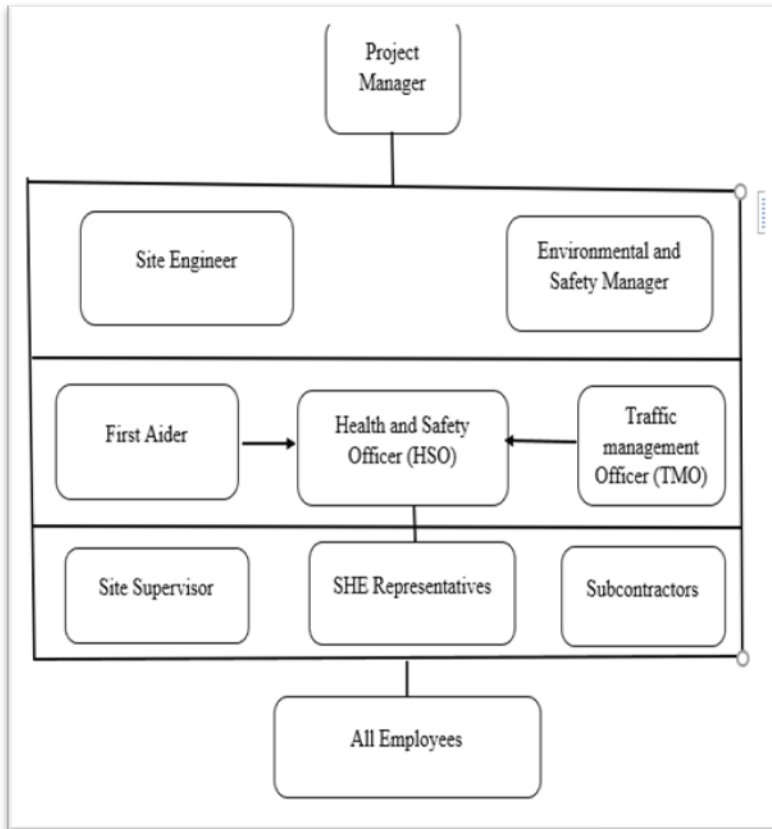
### **2.1.6 Engineering Risk Assessment**

Typically, during the engineering phase of the project, contractor assess potential hazards, and their associated risks, and ensure that adequate safety, loss prevention, and environmental requirements are included within the facility design to protect personnel and the environment by using Hazard Identification (HAZID), Safety Integrity Level (SIL) or the likes.

## **3.0 IMPLEMENTATION AND OPERATION**

### **Organizational Chart and Responsibility**

The chart provides an organizational chart for the implementation of this HSMP



**Figure 3.1:** Contractor's Organization chart for Implementation of HSMP

### 3.1 STRUCTURE AND RESPONSIBILITY

The roles, responsibilities and authorities of personnel, who manage, perform and verify activities having an effect on Occupational Health and Safety (OHS) risks have been defined, documented and communicated in order to facilitate OHS Management.

#### 3.1.1 Project Manager Responsibility

Ultimate responsibility for Safety and Health actions and the co-ordination of these actions with our workers and the general public

Provide all employees under their direct control with adequate support, supervision, information, instruction and training to enable them carry out their work safely and without risks to their health and safety

Establish effective lines of communication and consultation on safety and health issues among all employee

Ensure that suitable arrangements are in place for effective health and safety management

Allocate specific duties to key personnel to ensure that this health and safety management plan is produced, updated and effectively implemented

Ensure adequate provision of resources necessary to implement the Safety and Health management plan

Set objectives and performance targets and ensure they are regularly monitored, reviewed and communicated within the company

#### 3.1.2 Health and Safety Manager Responsibility

Safety manager will be responsible for the provision of Safety and Health support and advice, and for promoting a culture of continuous improvement in safety performance throughout the projects.

Monitor performance against the requirements of Safety and Health plan and the relevant legislation.

Liaise with, and assist Project Manager and all workers in ensuring that a satisfactory level of Safety and Health awareness exists.

Co-ordinate and supervise the activities of Safety and Health representatives

Assist the HR Officer in the development and delivery of suitable Health and Safety training or induction program to new employer and company in general

Undertake a program of site Safety and Health inspections and audits in accordance with the policy.

Produce, implement and maintain a safety performance measurement, review and reporting system which comply with both statutory and corporate requirements.

Collect and report safety performance data and trends analysis in accordance with this policy.

Manage the development, regular review and update of the Safety Management System in order to ensure that it is comprehensive, relevant and up-to-date

Be familiar with current Safety and Health legislation relevant to undertake activities and advise senior management accordingly.

### **3.1.3 Site Engineer Responsibility**

Site Engineer will be responsible for operation of the safety policies on their sites or projects. They should monitor each site to ensure the implementation of safety instructions. Responsibilities include

Understands the company policy and appreciate the responsibilities allocated to each grade.

Ensure adequate information is received regarding matters which might affect health and safety in order to determine the planning stages:

Most appropriate order and method of working

Allocation of responsibility to site controllers and subcontractors

Facilities for welfare and sanitation

Ensure Risk Assessment is undertaken and method statement prepared before work commenced on site.

Check over working methods and precautions with site management before work commenced on site

Ensure that once work started, it is carried out as planned and in conformity to relevant legislations.

Make sure that all workers on the project understand that management of Health and safety will be taken in to account when bonus and promotion is considered.

Release employees for SHE training

### **3.1.4 Site Controllers Responsibility**

Site controllers are responsible to the project managers for ensuring the day-to-day implementation of safety policy and safe working practices. Main responsibilities

Organize site so that work is carried out to the required standard at a minimum risk to workers, equipment and material – and to give all subcontractor representatives precise responsibilities for correct working methods

Implement health and safety plan and provide relevant information to the subcontractors.

Regularly monitor site rules and other instructions are complied with.

See to it that all health and safety legal requirements are complied with on site. That are registers, records and reports are in order and the competent person appointed has sufficient knowledge to operate safely.

Plan and maintain a tidy site

To implement arrangement with workers and other subcontractors on site to avoid any confusion about area of responsibility

Ensure that all hazardous materials are properly marked to enable adequate precaution to be taken

Make sure that appropriate PPE is available on site and worn all the working time

Ensure that first aid and emergency rescue materials are always on site and in good condition.

Create, ensure and encourage safe working environment

Reinforce positive safety initiatives and behaviour  
Report unsafe acts and conditions

### **3.1.5 All other Employee Responsibility**

All workers are responsible for ensuring the health and safety of themselves and others who might be affected by their actions and for co-operating at all times on health and safety matters. In particular, they should:

- i. Follows safety rules procedures
- ii. Participate in toolbox talks/meetings
- iii. Wear PPE as required
- iv. Safeguard life equipment before maintenance
- v. Knows own responsibility
- vi. Create a safe work environment for employees

### **3.1.6 Subcontractors Responsibility**

All sub-contractors at present;

- i. Understand and comply with the arrangements, rules defined in the health and safety plan
- ii. Allocate sufficient resources to ensure effective management of risks arising out of their work activity
- iii. Provide information to employees, including details of risk arising out of work activities
- iv. Follow any directives of the company staff to enable them to comply with their duties under health and safety requirements
- v. Inform the company of any injury, ill health, near miss or dangerous occurrence
- vi. Provide adequate PPE for their employees
- vii. Make sure that all their employees are inducted before allow to work on site
- viii. Provide the company with all relevant confirmation of competence of employees working on the project
- ix. Take liabilities of health and safety breaches/penalties of their employees.

## **3.2 TRAINING, AWARENESS AND COMPETENCE**

Personnel are competent to perform tasks that may impact on HSE in the workplace. Competence defined in terms of appropriate education, training and/or experience. Includes applied skills, knowledge experience and ability towards correct attitude.

The Health and Safety Officer ensures that only personnel with suitable qualification and experience are employed on work tasks which have the potential to cause harm, will take action to ensure that training requirements are met and that the effectiveness of training to meet requirements is monitored.

Health and Safety Officer ensure that all persons understand the importance of training and experience and how they can work effectively to ensure safe working, will also ensure that personnel are aware of the health and safety consequences of their work activities and the benefits of following safe working practices.

### **3.2.1 Awareness and Information**

Contractors shall make daily arrangements to check that personnel are provided with Health and Safety Information. All personnel attend the toolbox meeting prior to commencement of work on site, and arrangements made to all workers to carry out regular Tool Box Talks, the program and content of which will be communicated to contractor. In conformity with the laws of Tanzania, the company did not engage in acts that constitute child labor. If there is a need to engage students who are on educational attachment and are less than 18 years of age, special training was provided to them.

### **3.2.2 Induction Training**

The company will ensure that all their staff on site/office receives adequate Health and Safety training for their duties, a training record is held in the company safety department. Subcontractors will also ensure that their employees hold the appropriate training and competences to perform their jobs effectively.

### **3.3 CONSULTATION AND COMMUNICATION**

The company will communicate matters or sharing information regarding Occupational Health and Safety to internal and external stakeholders. This may include health and safety newsletters, legislation changes, policy and procedure updates, annual reports and significant incident and injury trends and information relating to OHS training.

Health and Safety Manager will communicate the following information to employees:

The risk profile (OHS Risk Register) of the workplace;

Policies and procedures specific to the workplace;

- i. Risk assessments; and
- ii. The following information should be prominently displayed both in company Offices and Sites
- iii. Location of First Aid Boxes
- iv. Identity of First Aiders
- v. Emergency Procedures and emergency phone numbers e.g., fire brigade
- vi. Insurance Details
- vii. Statutory Notices
- viii. Site Rule
- ix. Assembly point

Company Safety policy

#### **3.3.1 Consultation**

The company always consult employees on Health and Safety issues. This leads to creating and maintaining a safe and healthy working environment. This consultation involves not only the company Management giving information to employee but also listening to, and taking into account of what employees say before they make any decision on health and safety. Consultation to be carried out include

Any change that may considerably affect their health and safety at work, for example changes in procedure, equipment or methods of working

The health and safety consequences of introducing a new technology

The planning for health and safety training

#### **3.3.2 Toolbox talks**

Health and Safety manager will carry out toolbox talks on regular basis with workers every day or depending on timetable in the morning before work. A toolbox talk is carried out to give awareness on a new hazard or risk is identified, e.g., the introduction of new plant, equipment or a substance or in response to any health and safety related trends or in response to the needs of Risk Assessments and/or Method Statements.

#### **3.3.3 Health and Safety Communication Procedure**

The company will be committed to maintaining a safe and healthy working environment for all employees and non-employee members and would ensure that any complaint is dealt with in an expeditious and constructive manner.

Part of the continual systematic improvement of the OHS Management System is dependent on the feedback and reporting mechanisms from employees. Employees are actively encouraged to communicate issues or concerns relating to health and safety with their health and safety representative or management.

In the event that an employee reports a health and safety concern to their officer and they feel that there has been no action regarding the issue, they should discuss their concerns with the health and safety representative.

In attempting to resolve a matter that may be a risk to health and safety, Health and Safety Officer must use the applicable health and safety consultation arrangements and formally refer the matter to the manager. Management will consider the matter and respond in a timely manner.

If the matter is not resolved after the management have been given a reasonable opportunity to consider and respond, the health and safety representatives may request an investigation of the matter by the enforcing authority

### **3.3.4 Site Safety Meetings**

Site safety meetings will be held on a monthly pre scheduled basis and will be shared and nominated by Project Manager

The Site safety meetings are to be attended by all workers who are currently working on site, or whose start is imminent.

Minutes will be prepared and circulated to all stakeholders

### **3.3.5 Safety Site Meetings Agenda**

- i. Introduction
- ii. Approval of Previous Minutes
- iii. Matters arising
- iv. Accidents, diseases and dangerous occurrences – Review Site Details including lessons learnt.
- v. Safety Inspection
- vi. Safety performance monitoring
- vii. Health and safety planning interface with public.
- viii. Safety Training – inductions/Toolbox Talks etc.

### **1.3.6 Safety Promotion**

The organization is committed to safety promotion. As part of this commitment, the OHS Management System Manual will be made fully available to all employers and employees.

General safety promotion exercises will be conducted regularly throughout the year. These will involve both employers and employees, and are designed to raise everyone's awareness of health and safety issues within the workplace.

## **4.0 HEALTH AND SAFETY MANAGEMENT PLAN**

### **4.1 SAFE WORKING PROCEDURE FOR HIGH-RISK ACTIVITIES**

#### **4.1.1 Safe Work Procedures – Housekeeping on Construction Sites**

A basic concept in any effective prevention endeavor will be a good housekeeping during construction and camp activities. The importance of good housekeeping must be emphasized from the beginning through to the final clean-up. The degree of attention given to housekeeping will normally be reflected in the accident record as well as the installation efficiency.

The company ensure that any waste generated by their work activities shall be cleared upon completion of a work process, or as minimum at the end of the shift/day. Failure to comply with these requirements shall result in a 'Clear up Notice' being issued.

#### **4.1.2 Safety Instructions**

Prior to commencement of work Supervisor must be appointed

Before excavation starts, the company will make sure the exact location of any underground electrical cables, water and sewage and telecommunications cables is well known. Do not rely solely on-site plans and drawings, as these are sometimes not accurate or complete. Seek assistance



from the local services and distribution companies. Even then, proceed with caution. Older installations may not have been recorded.

The excavation work must be planned and the method of excavation and the type of support work, (if any) required decided. The stability of the ground must be verified by a competent person.

If necessary, to prevent danger, land must be cleared of trees, boulders and other obstructions.

No load, plant or equipment shall be placed or moved near the edge of any excavation where it is likely to cause its collapse and thereby endanger any person unless precautions such as the provision of shoring or piling are taken to prevent the sides from collapsing.

Make sure all workers in excavations always wear safety gloves, safety helmets and applicable safety boots.

Safeguard workers and the public from falling into excavations. Make sure trenches, shafts and excavations are properly barricaded, covered or isolated to prevent people.

Employees must be protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation.

Warning vests or other highly visible clothing must be provided and worn by all employees exposed to vehicular traffic.

Supervisors must ensure workers stand away from vehicles being loaded or unloaded.

Employees must be prohibited from going under suspended loads.

## **4.2 SAFE WORK PROCEDURES**

### **4.2.1 Instruction, Training and Supervision**

All operators shall receive information and training, including safety instructions provided by the manufacturer.

All operators must be instructed in safe work procedures specific to tasks done at the workplace and be made aware of the hazards and associated risks. This requirement has special significance when dealing with young, inexperienced workers.

All workers on site must receive induction training covering all possible hazards and risks, including hazards and risks that may occur during the use of concrete mixers or when hand mixing concrete. Proof of such induction must be available on site.

The site must be kept tidy in terms of waste / rubbish removal, storage and stacking of materials and of hazardous materials. Dangerous parts of plant and equipment must be guarded.

### **4.2.2 Safety Instructions – Manual Handling**

Hand tools must be of good design and construction, taking into account, as far as possible, health and safety and ergonomic principles.

Hand tools and other equipment must be regularly inspected for safe condition. Ensure tool handles are free of splits and cracks and handles are wedged tightly in the heads of all tools.

Workers must be trained for the safe use of shovels, wheelbarrows, screeds and vibrating equipment.

Workers must be trained in safe manual lifting and proper working postures when required to work in fixed working positions or when they are carrying out repetitive work and keep a hand tool inspection register on site

Suitable alkali-resistant gloves, coveralls and gum boots must be worn by all members of the team involved in concrete mixing and pouring.

Sufficient rest periods must be allowed.

### **4.2.3 Hazards Peculiar to Concrete Production**

Potential hazards for workers in concrete mixing include:

- i. Exposure to wet concrete can result in skin irritation or even first-, second- or third-degree chemical burns. Compounds such as hexavalent chromium may also be harmful.
- ii. Eye, skin, nose, mouth and respiratory tract irritation from exposure to cement dust;

- iii. Inadequate safety guards on equipment;
- iv. Inadequate lockout/tag out systems on machinery;
- v. Overexertion and awkward postures, slips, trips and falls.

### **4.3 SAFETY GUIDELINES**

Prevent or minimize skin contact with wet cement through wearing proper PPE like dust mask, gloves

Clothing or insides of shoes soiled with cement must be removed and cleaned before re-use.

Maintain good personal hygiene.

Eat and drink only in dust-free areas to avoid ingesting cement dust.

Do not use barrier cream on damaged skin.

Treat minor cuts and abrasions promptly.

### **4.4 PPE REQUIREMENTS**

Eye and respiratory protection must be worn if dry cement dust is significant.

Wear alkali-resistant gloves, overalls with long sleeves, full-length pants and waterproof boots where there is uncontrolled risk of skin contact with wet / drying cement.

### **4.5 FIRST-AID**

Rinse eyes splashed with wet concrete with water and then go to the hospital or clinic for further treatment.

Skin contact - wash with soap and water immediately. Contact a doctor if irritation or pain is persistent.

## **4.6 SAFE WORK PROCEDURES – BACKFILLING AND COMPACTION**

### **4.6.1 Instruction, Training and Supervision**

All workers involved in backfilling and compaction must receive information and training, including safety instructions. All workers must be instructed in safe work procedures specific to tasks done at the workplace and be made aware of the hazards and associated risks. This requirement has special significance when dealing with young, inexperienced workers. Workers must be made aware of hazards and risks when mobile earth moving and compacting equipment is being used.

One-to-one supervision must be provided for people receiving training, or who are unfamiliar with the use of hand tools and compacting equipment.

General supervision must be provided for all backfilling and compaction work.

Safety signage, i.e., protective clothing requirements, restricted area etc must be conspicuously placed on site.

All workers on site must receive induction training covering all possible hazards and risks, including hazards and risks that may occur during the backfilling and compaction process.

All backfilling and compaction work must be supervised by a competent person and all operatives doing the work must be given clear instructions.

The site must be kept tidy in terms of waste / rubbish removal, storage and stacking of materials and of hazardous materials. Dangerous parts of plant and equipment must be guarded. There must be full recognition that work near a public interface may need additional control mechanisms.

### **4.6.2 Safety Instructions**

Ensure that any underground electrical cables, gas lines, water and sewage and telecommunications cables that may be present inside the excavated area are properly sleeved or otherwise protected, before backfilling and compaction commence. Extreme caution must be exercised around such installations when backfilling and compacting.

If earthmoving plant is being used for backfilling:

Check that plant operators are appropriately qualified and competent.

Make sure unattended front-end loaders, backhoes and excavators are always left with the bucket fully lowered to the ground.

If backfilling is done manually ensure:

Hand tools should be good design and taking into account, as far as possible, health and safety and ergonomic principles.

Hand tools and other equipment are regularly inspected for safe condition; tool handles are free of splits and cracks and handles are wedged tightly in the heads of all tools; cracked handles are replaced promptly, not repaired or covered with tape.

Workers must be trained for the safe use of shovels and wheelbarrows.

Workers must be trained in safe manual lifting and proper working postures when required to work in fixed working positions or when they are carrying out repetitive work since improper lifting, awkward postures and repetitive motions can lead to sprains, strains and other musculoskeletal disorders.

Warning vests or other highly visible clothing must be provided and worn by all employees exposed to public vehicular traffic.

Supervisors must ensure workers stand away from mobile plant.

Employees must be trained to use personal protective and other rescue and first aid equipment.

Supervisors have the authority to remove workers from the excavation immediately. Be that for reasons of imminent danger or for noncompliance to safety rules.

#### **4.6.3 Safety Procedures**

Before working, barricade was put around the working area to prevent coming traffic from crashing into the operator and to keep workers and bystanders out of harm way.

Work area has to be clear of debris and other objects that could cause damage to the compactor or bodily injury.

No untrained person is allowed to operate construction equipment.

KEEP hands and feet and loose clothing clear of rotating and moving parts as they will cause injury if contacted.

DO NOT operate or refuel a petrol or diesel motor in a confined area without adequate ventilation.

Not to come in contact with the muffler when the engine is hot, since it can cause severe burns.

ENSURE that petrol is only stored in an approved storage container. DO NOT refuel the motor while it is in operation or hot.

#### **4.7 TRANSPORTING OF MATERIALS**

All materials transported in a vehicle must be secured against excessive movement. Vehicles must not be overloaded in terms of weight and bulk.

Where goods or material are transported in the back of vehicles there is a risk that these items could cause injury or death to the driver or passengers in a collision, cargo barriers must be fitted.

Transportation of material has to be done during the night so that to reduce disturbances and spread of pollutants

#### **4.8 DRIVER RESPONSIBILITIES**

All employees who drive company vehicles must have the appropriate training for the type of vehicle and conditions. They must have read and understood the policies, procedures and safety guidelines before allowed to drive

Employees using the company vehicles must be familiar with routine maintenance before driving the vehicle. Such procedures include:

- i. No employee may use a vehicle that they deem to be unsafe or which has been withdrawn from use for repair.
- ii. Know what the correct fuel is when filling

- iii. Checking the oil regularly and the water regularly
- iv. Ensure vision is unimpaired
- v. Ensure windscreen, windows, mirrors and lights are clean
- vi. Ensure seat belts, lights and indicators work
- vii. Ensure no other hazards are apparent
- viii. Correct footwear must be worn whilst driving. Bare feet, sandals (flip-flops) and muddy boots are not allowed.
- ix. In the event of an accident employees must follow the procedure as outlined in the guidelines provided with the vehicle.

#### **4.8.1 DRIVERS GUIDELINES**

##### **Driver Fatigue**

Driver fatigue is commonly thought of as falling asleep at the wheel. Falling asleep is the extreme stage of fatigue. You can be fatigued to the point of having your driving impaired well before you 'nod off' at the wheel.

The signs and symptoms for fatigue include forgetfulness, being fixated, poor decision making, apathy, slowed reaction times, lethargy, moodiness, poor communication and nodding off.

Fatigued drivers have slower reaction times, endangering themselves and others when they encounter unusual, unexpected or emergency situations.

Fatigue often combines with other factors such as drug/alcohol, loss of sleep, sleep disorders, stress, speed and circadian rhythms (in-built body clock in the brain that co-ordinates daily cycles experienced as the worst times of the day when you experience physical and mental performance of the day).

How to stay alert:

Wear a seat belt

Do not exceed speed limits.

Eat sensibly avoiding large meals.

Do not drink alcohol and drive

Avoid driving or take extra care driving in congested road especially in the campus

Driving at night is more hazardous than during the daytime so extra care is needed.

**Speed**

Speeding or driving too fast is putting you and other road users at risk. Contractor's drivers will abide safety travel. High speed may result to;

The faster you travel on a road, the more likely you are to crash.

The faster you travel the more likely you are to miss important hazard clues.

Higher speeds result in more severe injuries and damage.

The severity of injuries to a pedestrian is greater if the impact is greater due to the speed. The risks are higher for the elderly and young children.

**Drug and Drink Driving**

Once alcohol is absorbed into your bloodstream it is taken up by cells in your vital organs including the brain resulting in slower reactions, dulling your judgment and vision and impairing your ability to drive.

The chances of crashing are greater and you are three times more likely to be involved in a crash if your blood alcohol level is at the legal limit (80 mg per 100 ml) than if you have not had a drink.

No driver will be allowed even to enter into the site when suspected to be drunk.

1. Everyone's perception of how much you can drink is different. The law is precise. If you are an adult, the legal blood alcohol limit is not more than 80 mg of alcohol per 100 ml of blood.

2. If you are under 18 years of age, you should not drink any alcohol before you drive. Your limit is 30 mg per 100ml.

Prohibited (including controlled substances) and medicinal drugs impair mental and physical functions and can potentially contribute to road accidents.

Combination of prohibited or medicinal drugs with alcohol greatly increases the risk factor for an accident.

Many prohibited and medicinal drugs can directly affect the central nervous system therefore has an effect on the psychomotor performances and driving.

**Medical and Health Conditions**

A person with a medical condition such as allergies (bees/wasps), diabetes, epilepsy, dementia, poor vision or who has had a head injury, heart attack or stroke, must seek medical advice before driving. Disabilities such as broken arms or legs, migraines etc., may not stop the person driving but may complicate their safety and the safety of other road users.

Inform your assistant project manager or the person responsible for the vehicle if any of these conditions

## **5.0 EMERGENCY PREPAREDNESS AND RESPONSE**

### **5.1 Procedure for Emergency Preparedness Response**

The contractor will establish and maintain plans and procedures up to date to identify the potential for, and responses to, incidents and emergency situations, and for preventing and mitigating the likeliness and injury that may be associated with them. Possible Emergency situations will include but not limited to the following;

Incidents leading to serious injuries or ill health. In an event that incidents leading to serious injuries or ill health occur, the following procedure will be followed.

- Inform the first aider around to receive first aid treatment.
- Report to the nearest medical facility for further treatment
- The incident should be reported to your site operator or assistant project manager to be recorded in the Incident register by the Health and Safety Officer.
- Loss time of injury or ill health should be reported and recorded in the register.
- Fires and explosions,
- In an event of fire and explosion the company employee should follow the following

#### **5.1.1 Fire Exist Plan**

The preservation of life shall override all other considerations, such as saving property and extinguishing the fire. If a fire is discovered, the alarm shall be raised immediately however small the fire. All staffs are empowered to raise a fire alarm if they believe there is a fire; no authority should be sought from any other person. In the event of fire, the three most important actions are, in chronological order, to:

- Raise the alarm
- Dismiss the fire brigade
- Evacuate the building
- When firm is alarm sounds: All nonemergency committee personnel will go out the first available exit that is safe and then to the parking lot.

#### **5.2 Fire Response Instructions**

- Without endangering yourself, notify any employees, or guests in immediate danger zone of smoke, heat, or fire.
- Close all doors to prevent the spread of the fire.
- If possible, and if trained to do so, help extinguish the fire by using one of the public/department fire extinguishers.
- Never permit the fire and or smoke to come between you and your route of escape.

- Advice all employees, students/ guests of the nearest safe fire exit.
- Do not attempt to use the elevator under any circumstances.
- If you encounter smoke in a hallway, stairwell, anywhere, stop; go back to a safe area and look for another means of escape.
- Keep doors and windows in the area of the fire closed, to minimize further fire spreading.

Traffic accidents.

- Procedure for Traffic Accident shall be:
- Report to the nearest police station and obtain Police form to go to the hospital
- Report the incident to your line manager

### **5.3 Evacuation Plan**

Evacuation of the building should be done quickly and calmly. Safety of staffs, students and guests should be the primary concern. Each department will appoint one of its staffs to oversee fellow staff members' and students' evacuation from the building. This employee will be responsible for needed supplies and the general safety of the department's staff members.

### **5.4 Emergency Equipment**

The contractor shall at all-time keep possible emergency equipment that will be used during an emergency situation and employees will be trained in the use of those equipment.

## **6.0 CHECKING AND PROTECTIVE ACTION**

### **6.1 Protection of Workers against Dust**

Dust control will be initiated prior to any activity in dusty condition. Such control will adopt but not limiting to de-dusting procedures. In case of unavoidable dust emissions, use of PPE will be adopted and in any case no personnel shall be exposed directly to harmful airborne contaminants of Silica, Rust (ferrous oxide), Blasting grit, Asbestos, Glass wool & Paint solvent mist. Water sprinkling shall be done at least three times in a day to control the dust on all identified areas of the project to prevent damaging dwellings or causing nuisance to persons and traffic or any other measures as directed by RE. Construction safety nets will be used as appropriate.

### **6.2 Protection of Workers against Noise**

The Contractor shall comply with the applicable Tanzanian laws, orders and regulation concerning the prevention, control and abatement of excessive noise. Industrial deafness is cause by over exposure to high levels of noise from plant, machinery or construction processes. No employees shall be exposed to noise dose that exceeds 85 dB (A), unless they are wearing suitable hearing protectors, which effectively reduce the sound level at the user's level to or below 85 dB (A). Consideration shall be given first to reducing the noise level at source. The precautionary measures for the exposure limits shall be as follows:

- 80 to 85 dB (A) – Provide hearing defenders with proper training to use them.
- 85 dB (A) – Signposts shall be erected to inform all employees that usage of ear muffles is mandatory in the area.
- 115dB (A) – No exposure to steady noise irrespective of hearing protection.
- 135 dB (A) – No exposure to impulse noise irrespective of duration of hearing protection.

In case of blasting, the use of Jackhammer, pile driving, rock crushing or other operational producing high intensity impact noise may be performed at night upon approval of the RE and giving prior (at least 24 hours) notice to the nearest receptors.

### **6.3 Protection of Workers against Hazardous Substances**

Material Safety Data Sheet (MSDS) of all hazardous materials that are used on site shall be obtained. An inventory shall be kept of all such materials with the relevant MSDS and shall be

available for the inspection by RE. An assessment shall be conducted in relation to the intended usage of the hazardous substances on site and adequate precautionary and control measures shall be taken according to the assessment. Such MSDS shall be available for inspection from Tanzania Health and Safety law in force. An assessment shall be conducted in relation to the intended use of the hazardous substances on site and adequate precautionary and control measures shall be taken according to the assessment.

#### 6.4 Communication Arrangements

The results of OHS performance measuring exercises are to be communicated to all relevant personnel. Safety reviews are carried out monthly by the company health and safety officer. Lessons learned in terms of standards achieved compared with the standards set will be applied for future work where applicable. Safety reviews is used in updating this safety plan, and on completion of the project, an overall safety review will be held, the lessons learned contributing to future projects.

#### 6.5 Indicators of OH&S Performance

The company will monitor the Health and Safety performance of its projects, employers and employees as a whole to ensure that we achieve what we have planned and work to improve. Site safety performance shall be measured in the same way, with projects being monitored against set Key Performance indicators. These KPI's will be with the use of checklist use during:

- Site inspections
- Equipment inspection
- Workplace condition standards and inspection
- The areas in the table below will also be considered in the performance assessment.

**Table 6.1:** Consideration area for Performance assessment

1	Project Team health, safety and Environmental Training	2	Risk Assessment
3	Standard Operation procedures (SOPs)	4	Site Inductions
5	Employer and employee Meetings	6	Accident Follow ups
7	Skills Certification	8	Safety Committee Meetings
9	Tool Box Talks		

#### 6.6 Evaluation of Compliance

The company establish and maintain procedures for defining responsibility and authority for the handling and investigation of:

- Accidents
- Incidents
- Non-conformances
- The procedure adopted by the company is the use of Accident, incident and Non-Conformance form in the evaluation of compliance.

#### 7.0 REPORTING OF ACCIDENTS/INCIDENTS

All workers and subcontractors will be familiar with these requirements and ensure that all personnel on site report any accident/incident, near miss or disease to them immediately. All injury accidents will be recorded in the project Accident Book. A copy of the entries is made available to the health and safety management team. The following accidents should be reported as soon as they occur to Health and Safety Officer or Assistant Project Manager.

- Fatal accidents/major Injury and Dangerous occurrence
- Environmental incident

## **7.1 INVESTIGATION**

Health and Safety Officer and Project Managers shall ensure that for any incident/accident full investigation is carried out to determine the cause of the event. The investigation may require the taking of statements from witnesses, preparation of sketches and drawings and taking photographs. Areas where fatalities, major injuries or dangerous occurrences occur are to be sealed off, no further work undertaken until the investigation is complete and the enforcing authority through the company Manager.

### **7.1.1 Internal Audit**

Contractor shall conduct audit as per its procedures in order to assess the implementation of OHSMP and its performance.

### **7.1.2 Management Review Meeting**

The contractor top management shall carry out management review of Health and Safety management system, on a monthly basis. The review shall focus on the overall performance of the OH&S management system and not on specific details.

## **7.3 GENERAL SITE RULES**

The following Site Rules will be briefed to all personnel during the Site Induction Course and will be displayed in all site offices. Visitors to site are advised and accompanied by members of the company team.

Rules:

-Site tidiness: a clean site is a safe site.

-PPE: these must be worn at all times. Employer provides safety helmets, Hi Visibility jackets and safety footwear, Gloves and Safety Glasses.

-Accidents: all accidents no matter how minor must be reported to the company Health and Safety officer or Assistant Project Manager immediately.

Alcohol and Drugs and Smoking: alcoholic liquor and drugs are not to be brought onto, or consumed on the project sites. Do not enter the site if you are under the influence of either. Smoking will only be permitted in designated smoking zones.

-Electricity: do not tamper with, or alter, electrical installations. A qualified electrician must always carry out repairs and alterations.

Plants, machines and Equipment: before using plant and equipment, personnel must receive adequate training and whenever possible Certificate of competence must be registered

-Security: materials, plant and equipment must not be removed from site without written authority from the company Site Controller. All individuals and subcontractors are responsible for security of their own property, including tools.

-Fire: take note of the emergency plan – Escape routes, Assembly Points and Fire points. Do not tamper with Fire Extinguishers: they are there for the safety of all. Smoking is not permitted at camp site and to highly flammability equipment during road construction.

-Radios: radios, CD's, personal stereos are not permitted at workplace during working time

-Safety violation: Safety violation notices is issued to any individual not complying with the site rules after a verbal warning (yellow card). On receipt of a second violation (red card) of the same rule the individual will be removed from site.



## Appendix VI: Hydrology Study Report

### 1.0 Road Drainage Systems and Flood Protection

This section presents the suggested system to protect Igoma –Buhongwa road from external generated flood flow coming from surrounding catchments.

Storm water drainage elements should be capable of conveying the design peak flow without causing any risks or hazards on road.

#### 1.1 Hydrological Analysis

##### 1.1.1 Analysis of rainfall data

Annual Maximum (AM) daily data from 1990 to 2018 (29 years) at Mwanza Airport have been received from Tanzania Meteorological Agency (TMA). The data is given in the following table.

**Table 0-1: Mwanza Airport AM daily data from TMA.**

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Depth (mm)	93.2	70.9	59.9	60.5	108.7	78.1	67.8	95.0	52.7	81.4
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Depth (mm)	52.1	50.5	148	86.5	78.3	116.6	66.6	81.3	52.5	134
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	--
Depth (mm)	70.4	62.0	136.9	50.7	75.4	92.1	91.1	73.5	68.1	--

Additional data for Mwanza Airport were also collected from SIEREM (2021). The data extend from 1949 to 1999 (51 years). The data is given in the following table.

**Table 0-2: Mwanza Airport AM daily data from SIEREM.**

Year	1949	1950	1951	1952	1953	1954	1955	1956	1957
Depth (mm)	96	54	112	61	46	116	99	40	55
Year	1958	1959	1960	1961	1962	1963	1964	1965	1966
Depth (mm)	78	66	63	118	151	56	96	130	72
Year	1967	1968	1969	1970	1971	1972	1973	1974	1975
Depth (mm)	51	146	98	50	47	40	79	57	159
Year	1976	1977	1978	1979	1980	1981	1982	1983	1984
Depth (mm)	110	49	67	70	60	60	73	63	59
Year	1985	1986	1987	1988	1989	1990	1991	1992	1993
Depth (mm)	61	68	97	56	87	93	71	60	61
Year	1994	1995	1996	1997	1998	1999	--	--	--
Depth (mm)	109	78	68	95	76	81	--	--	--

There is an overlapping period between the two datasets from 1990 to 1999 (10 years). The overlapped data is identical except for 1998 which is 52.7 in the TMA data set and 76 in the SIEREM data set. The TMA value was taken as the correct value. However, changing the value

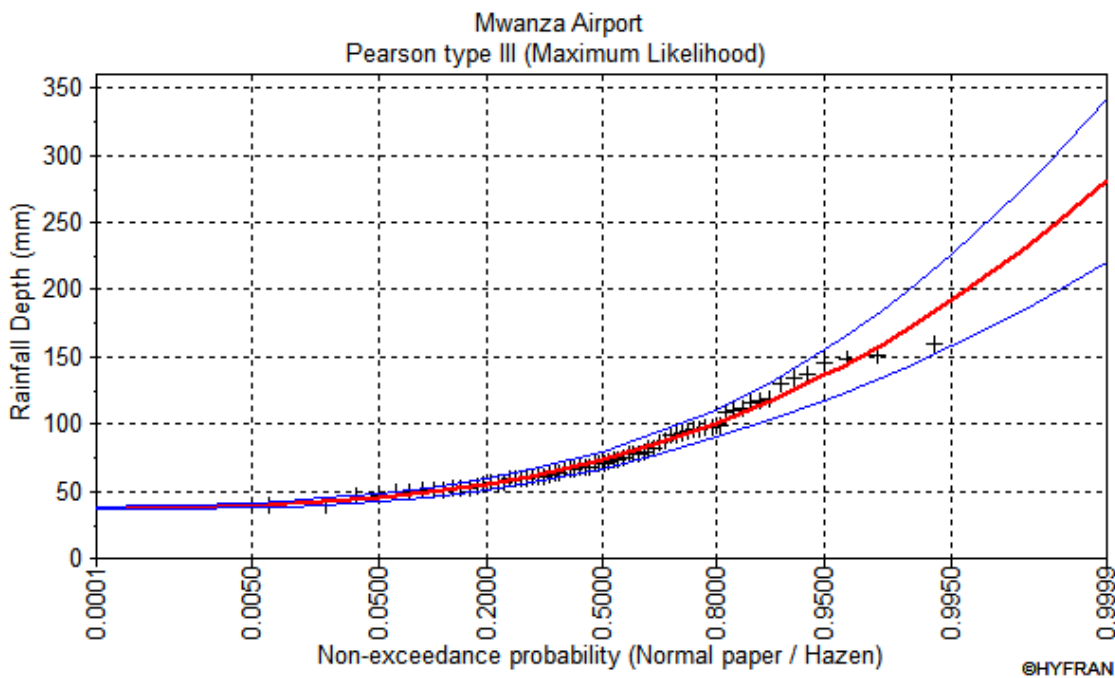
does not actually affect the results of the frequency analysis. The combined dataset therefore consists of data from a 70-year period.

Frequency analysis was conducted on the full dataset using the Hyfran software. Several common statistical distributions were examined and compared using the Maximum Likelihood (ML) method of parameter estimation. The performance of different distributions is given in the following table. Where it is evident that the Pearson type III distribution is the most suitable distribution. The fit is shown in **Figure 0-1**.

**Table 0-3: Performance of statistical distributions<sup>1</sup>, Mwanza Airport station.**

Distribution	$N_p$	$X_{100}$	$P(M_i)$	$P(M_i x)$	BIC	AIC
Pearson type III	3	175.3	14.3	36.1	658.7	651.9
Gumbel	2	163.0	14.3	24.8	659.4	654.9
Lognormal	2	165.5	14.3	22.0	659.7	655.2
GEV	3	203.1	14.3	12.9	660.7	654.0
Gamma	2	155.9	14.3	2.9	663.7	659.2
Exponential	2	224.4	14.3	1.2	665.5	661.0
Weibull	2	151.5	14.3	0.01	675.1	670.6

<sup>1</sup>  $N_p$  = Number of parameters,  $X_{100}$  = 100-year quantile,  $P(M_i)$  = A priori probability,  $P(M_i|x)$  = A posteriori probability (Schwarz method), BIC = Bayes Information Criterion, AIC = Akaike Information Criterion.



**Figure 0-1: The Pearson type III distribution fit to Mwanza Airport AM daily rainfall data.**

The results of frequency analysis for different return periods are given in the following table.

Where the rainfall depths were multiplied by a factor of 1.13 to correct for the effect of fixed-duration observation of rainfall and derive the true 24-hour rainfall depth (US Weather Bureau, 1961; WMO, 2009; Bureau of Meteorology, 2005).

**Table 0-4: Design 24-hour rainfall depth for Mwanza.**

T (year)	2	5	10	25	50	100	200
Depth (mm)	82.5	113.0	134.5	160.5	179.7	197.8	217.0

### 1.1.2 Intensity Duration Frequency curves

Due to the lack of short duration data (5-minute, 10-minute, hourly, ... etc.), rainfall depths and intensities for sub-daily periods can only be obtained by applying a general formula suggested by the Transport and Road Research Laboratory (TRRL) (Fiddes et al., 1974). The TRRL formula for the ratio of short-duration rainfall depth to 24-hour rainfall depth is given by

$$R_T = \left(\frac{T}{24}\right) \left(\frac{24+b}{T+b}\right)^n \quad (1)$$

where  $R_T$  is the ratio of rainfall depth of duration T to 24-hour rainfall depth,  $b = 1/3$ , and  $n$  is a constant which depends on the location of the station. Given that Mwanza is an inland station, the recommended value of  $n$  can be taken as 0.98 for a 2-year return period and 0.96 for higher return periods (Fiddes et al., 1974, Table 9).

**Table 0-5: Design 24-hour rainfall depth for Mwanza.**

T (year)	2	5	10	25	50	100	200
Depth (mm)	82.5	113.0	134.5	160.5	179.7	197.8	217.0

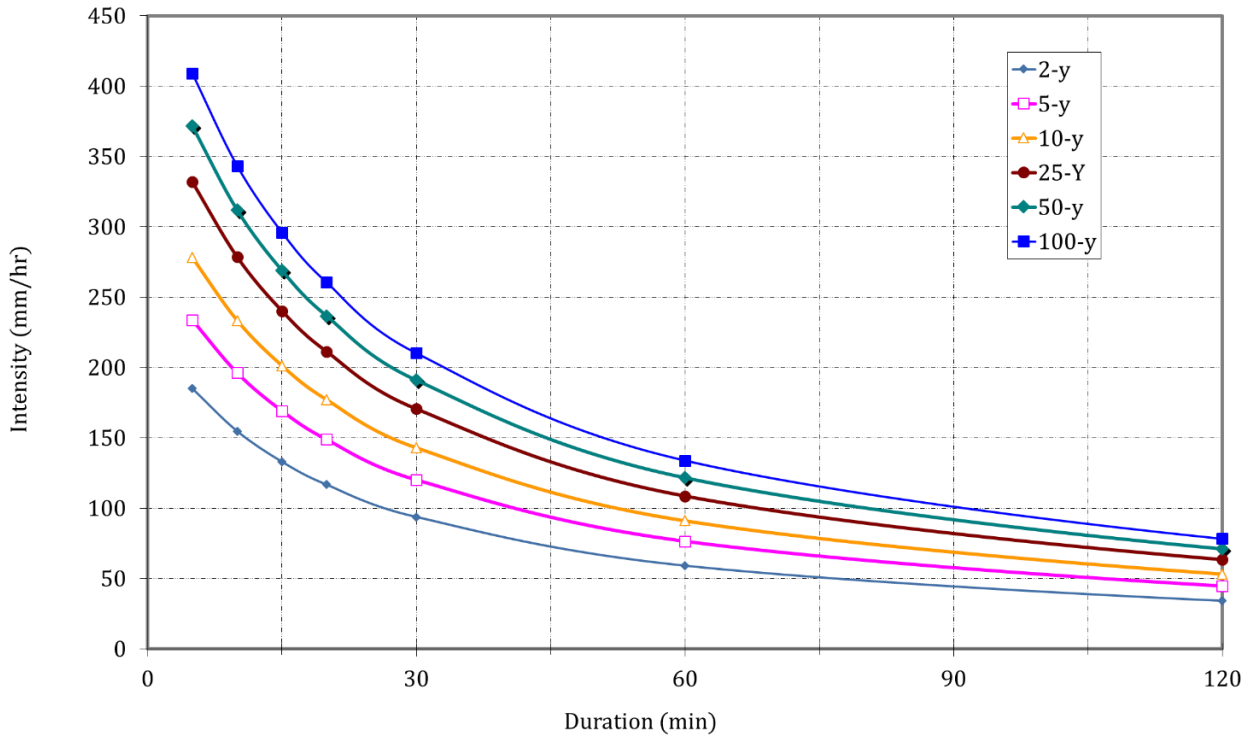
Using the frequency analysis results in **Table 0-5** above with the ratios from Eq. (1), the Depth-Duration-Frequency (DDF) values as well as the Intensity-Duration-Frequency (IDF) values can be calculated. These are given in **Table 0-6** and **Table 0-7**. The resulting IDF curves are shown in **Figure 0-2**.

**Table 0-6: Depth-Duration-Frequency (DDF) values for Mwanza**

T (years)	Rainfall Depth (mm) for Duration (minutes)										
	5	10	15	20	30	60	120	180	360	720	1440
2	15.4	25.8	33.3	38.9	46.9	59.2	68.4	72.3	77.1	80.3	82.5
5	19.5	32.7	42.3	49.6	60.1	76.5	89.4	95.2	103	108	113
10	23.2	38.9	50.3	59.0	71.5	91.0	106	113	122	129	134
25	27.7	46.4	60.1	70.4	85.3	109	127	135	146	154	160
50	31.0	52.0	67.2	78.9	95.5	122	142	151	164	172	180
100	34.1	57.2	74.0	86.8	105	134	156	167	180	190	198

**Table 0-7: Intensity-Duration-Frequency (IDF) values for Mwanza**

T (years)	Rainfall Intensity (mm/hour) for Duration (minutes)										
	5	10	15	20	30	60	120	180	360	720	1440
2	185	155	133	117	93.8	59.2	34.2	24.1	12.9	6.69	3.44
5	234	196	169	149	120	76.5	44.7	31.7	17.1	9.04	4.71
10	278	233	201	177	143	91.0	53.2	37.8	20.4	10.8	5.60
25	332	279	240	211	171	109	63.5	45.1	24.3	12.8	6.69
50	372	312	269	237	191	122	71.1	50.5	27.3	14.4	7.49
100	409	343	296	260	210	134	78.2	55.6	30.0	15.8	8.24



**Figure 0-2: Intensity-Duration-Frequency (IDF) curves for Mwanza.**

### 1.1.3 Areal Reduction Factor

The ARF theoretically range from 0 to 1, however, the common practical range is from 0.6 to 1. The ARF varies according to storm characteristics (recurrence interval), and watershed characteristics (watershed size, shape, and geographic location).

The spatial variability of rainfall must be considered, where the observations show differences between the rain gauge records for a concurrent date.

ARF estimates are based on empirical methods. This section presents an ARF developed for Mwanza City based on the collected precipitation depths from 5 meteorological stations.

The developed equation used for design purposes is as follows:

$$ARF = 1 - 0.1424 \log (A + 1)$$

Where:

- ARF is the Area Reduction Factor
- A is the surface area of the catchment in km<sup>2</sup>

## 1.2 Hydrological design criteria

### 1.2.1 Rainfall-Runoff Transform Model

Several methods may be used to estimate watershed runoff. The application of each method depends on the availability and type of rainfall, flow records, and the catchment size. Methods considered in this analysis are:

- The TRRL/ East African Flood Model
- The Rational Method

The rational method will be used to calculate the design flood values for catchments not exceeding 500 ha, while the TRRL method will be used for catchments larger than 500 ha.

#### Rational Method

The estimate of peak discharges for different return periods using this method is stated as follows:

$$Q = 0.278 \times C \times I \times A$$

Where:

Q: Peak discharge (m<sup>3</sup>/s).

C: Runoff coefficient.

A: Catchment area (km<sup>2</sup>).

I: Rainfall intensity corresponding to the catchment time of concentration (T<sub>c</sub>)(mm/hr).

The runoff coefficient (C) reflecting the percentage of water flowing on saturated soil will be estimated using **Table 0-8**.

**Table 0-8: runoff coefficient (C) reflecting the percentage of water flowing on saturated soil**

Type of Drainage Area	Runoff Coefficient, C
<b>Business</b>	
Downtown areas	0.70 - 0.95
Neighbourhood areas	0.50 - 0.70
<b>Residential</b>	
Single-family areas	0.30 - 0.50
Multi-units, detached	0.40 - 0.60
Multi-units, attached	0.60 - 0.75
Suburban	0.25 - 0.40
Apartment dwelling areas	0.50 - 0.70
<b>Industrial</b>	
Light areas	0.50 - 0.80
Heavy areas	0.60 - 0.90
Parks, cemeteries	0.10 - 0.25
Playgrounds	0.20 - 0.40
Railroad yard areas	0.20 - 0.40
Unimproved areas	0.10 - 0.30
<b>Lawns</b>	
Sandy soil, flat, 2 per cent	0.05 - 0.10
Sandy soil, average, 2 to 7 per cent	0.10 - 0.15
Sandy soil, steep, 7 per cent	0.15 - 0.20
Heavy soil, flat, 2 per cent	0.13 - 0.17
Heavy soil, average, 2 to 7 per cent	0.18 - 0.22
Heavy soil, steep, 7 per cent	0.25 - 0.35
<b>Streets</b>	
Asphaltic	0.70 - 0.95
Concrete	0.80 - 0.95
Brick	0.70 - 0.85
Drives and walks	0.75 - 0.85

Type of Drainage Area	Runoff Coefficient, C
Roofs	0.75 - 0.95

Higher values are usually appropriate for steep areas and longer return periods because infiltration and other losses have a proportionally smaller effect on runoff in these cases.

### SCS Method

The method of the United States Soil Conservation Service (SCS) - (now called the Natural Resource Conservation Service "NRCS") - estimates runoff using catchment characteristics such as antecedent runoff conditions, type of soil, initial abstraction of rainfall, surface treatment as well as land cover. These characteristics are represented by a lumped empirical parameter annotated (CN); the Curve Number, a value used for predicting direct runoff or rainfall excess.

This number typically ranges from 45 (for low runoff depressions) to 98 (for paved impervious areas). An initial abstraction factor (Ia) is specified to reflect the amount of rain depth deducted before effective runoff is generated, such as initial infiltration losses prior to top soil wetness, or rainfall interception by vegetation. The SCS-CN method typically uses an initial abstraction of 0.2S, where S is the potential maximum soil storage depth (in mm) and is calculated from the equation below.

$$S = 25.4 \left( \frac{1000}{CN} - 10 \right)$$

Soil is broadly classified into four different hydrologic groups: A, B, C, and D based on their runoff potential. Soil type A has a low runoff potential, as well as a high infiltration rate and water transmission. This group covers soils such as deep sand, deep loess, and aggregated silt. Soil type B has moderate infiltration and water transmission rates. This group includes shallow loess and sandy loam. Soil type C has slow infiltration and water transmission rates even if thoroughly wetted. This group includes layered soils with high fine textures such as clay loam, shallow sandy loam, soils low in organic contents, and soils of high clay contents. Finally, soil D has a very high runoff potential due to a very low infiltration and water transmission rates. This group includes most of clay soils and soils of high swelling potentials.

Hydrologic soil groups B, C, and D may be chosen to represent the hydrological condition of the soil in general. The Curve Number (CN) associated with normal (average) Antecedent Moisture Conditions (AMC II) for desert soils with vegetation cover ranges from 73 to 85. This value is a very conservative estimate of the curve number and yields a larger value of peak flow. While CN for residential areas may be taken as 91, the CN for mountainous areas may be taken as 85.

The SCS-CN method calculates the volume of runoff given the rainfall depth as an input and the CN value. This relation is given by:

$$Q = \frac{(P - 0.2 S)^2}{P + 0.8 S}$$

Where:

- Q is the accumulated depth of runoff (mm);
- P is the accumulated depth of storm rainfall (mm); and
- S is a function of the CN value as given earlier (mm).

### The TRRL/ East African Flood Model

The East African Flood Model is applicable to all catchments with areas between 1km<sup>2</sup> and 200Km<sup>2</sup>. This is the range in which the EAFM is proven to provide accurate results (D. Fiddes, 1977). Major limitations and assumptions of this method have to be taken into account.

Nevertheless, the TRRL/EAFM requires other catchment characteristics to be able to estimate the discharges. **Table 0-9** below illustrates the type of data required by the model.

**Table 0-9: Data required by the EAFM from the catchment under consideration**

No.	Descriptions	Symbol	Units
1	Catchment Area	A	km <sup>2</sup>
2	Land/Catchment Slope (s)	S	m/m
3	Channel Length (L)	L	Km
4	Elevation at the channel source	Es	M
5	Elevation at the channel exist	Ee	M
6	Catchment Type	None	None
7	Lag time (K)	K	Hr
8	Soil Type	None	Unit less
9	Standard Contributing area coefficient	C <sub>s</sub>	Unit less
10	Rainfall Zone (dry/wet)	None	Unit less
11	Catchment wetness factor	C <sub>w</sub>	Unit less
12	Land use factor	C <sub>L</sub>	Unit less
13	Rainfall time	T <sub>p</sub>	Hr
14	Rainfall time index	N	Unit less
15	2-year daily point rainfall	R <sup>2</sup> /24	Mm
16	10 year: 2-year ratio	R	Unit less

The type of information required by the EAFM above from any catchment can broadly be divided into two groups. The first group consists of rainfall related information while the second group consists of soil/land characteristics.

Four steps determine the rainfall related information:

- The 24 hrs point rainfall for 2-year return period is read from a storm rainfall isohyetal map of East Africa;
- The 2-year 24 hrs rainfall is converted to a 24 hrs storm of the desired return period by means of generalized rainfall growth curves
- A depth – duration rainfall equation is used to calculate the point rainfall for the appropriate time of concentration of the catchment;

The point rainfall depth is by means of an aerial reduction factor converted to an average rainfall over the catchment which is the required rainfall input for the discharge estimation models.

The group two type of information can be further sub divided into two sub groups. The first sub group includes information which can be obtained directly from the topographic map such as catchment area, land slope, channel length, elevation, and soil type and land use factor. The second sub group comprises the factors which have been defined in the EAFM TRRL laboratory report 706 (Fiddes, 1976). These factors include lag time and standard contributing area coefficient.

### 1.2.2 Curve Number Estimation

The Consultant reviewed future land use, land cover and available soil cover and generated a CN map. The Curve Number (CN) Map for Mwanza city is included in the DSDP report.

The Used CN map has been prepared based on the Global Hydrologic Soil Groups (HYSOGs250m) for Curve Number-Based Runoff Modeling ([https://daac.ornl.gov/cgi-bin/dsvviewer.pl?ds\\_id=1566](https://daac.ornl.gov/cgi-bin/dsvviewer.pl?ds_id=1566))

and the Natural Resources Conservation Service (NRCS) – TR 55 as reference for determining the CN value for different land uses.

The study area has a Tropical climate with two well-defined seasons: a wet season and a dry season; Therefore, the Antecedent Moisture Conditions (AMC) were considered.

To weight the found curve numbers to reflect AMCIII conditions (wet conditions), the following equation was used.

$$CN(III) = \frac{23 \times CN(II)}{10 + 0.13 \times CN(II)}$$

Where:

- CN(II): the normal conditions CN value
- CN(III): the wet condition CN Value

After producing the CN map, weighted curve number was then calculated for each catchment.

The curve number is a value used for predicting direct runoff or rainfall excess. weighted curve number was calculated for each catchment.

### 1.2.3 Design Return Period

The frequency of a storm event represents the number of occurrences of that event within a specified period. The frequency of the storm event reflects the degree of risk of flooding. The design frequency depends on the importance of the area to be drained and the location of the drainage system. The return periods adopted in the storm drainage development plan are the following:

- The peak flow through the river / stream will be estimated for a return period of 50 years for box culverts and 100 years for bridges.
- 25 years for pipe culverts and drainage systems.

### 1.2.4 Climate Change Impacts

The CORDEX regional climate model (RCM) CORDEX-Africa is used in this analysis. The model is driven by 9 different global climate models (CCCma-CanESM2, CNRM-CERFACS-CNRM-CM5, CSIRO-QCCCE-CSIRO-Mk3-6-0, IPSL-IPSL-CM5A-MR, MIROC-MIROC5, MOHC-HadGEM2-ES, MPI-M-MPI-ESM-LR, NCC-NorESM1-M, and NOAA-GFDL-GFDL-ESM2M). The RCM uses dynamic downscaling to a resolution of 0.44° (~50 km). For proper comparison between future and historical conditions, simulation results from the models for each station were bias corrected to have the same mean and variance of the historical record in the baseline period (1951-2005) using Detrended Quantile Mapping (DQM) (Cannon et al., 2015). As customary in the analysis of climate change studies, and due to the disparity of model results, the conclusions are based on the median value of all 9 model results. The analyzed projections are based on Representative Concentration Pathway RCP 4.5. The RCP 4.5 scenario is a stabilization scenario, which means the radiative forcing level stabilizes at 4.5 W/m<sup>2</sup> before 2100 by employment of a range of technologies and strategies for reducing greenhouse gas emissions. The RCP 4.5 scenario is described by the IPCC as the most probable baseline scenario taking into account the exhaustible character of non-renewable fuels. For this analysis, we consider changes in maximum daily rainfall in the future 50 years (2020-2070).

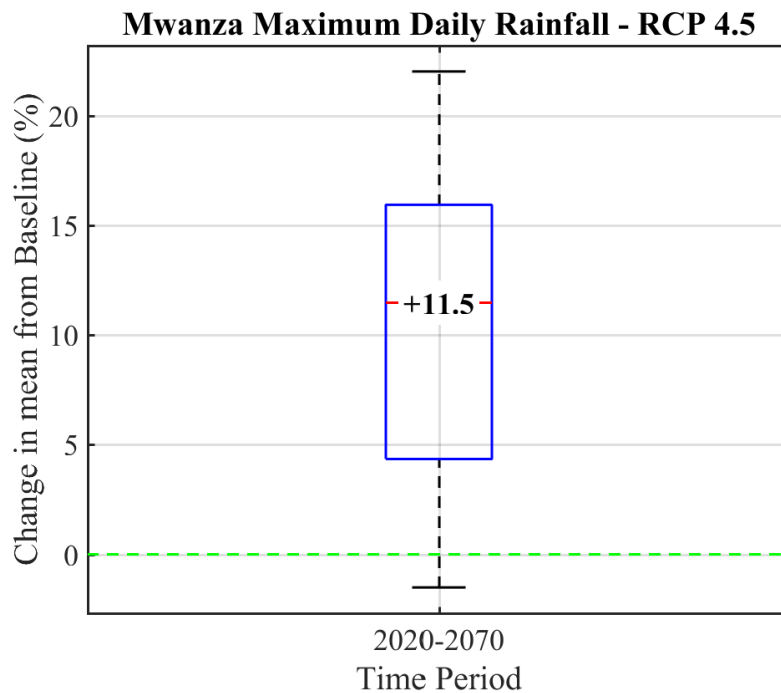
In this analysis we concentrate on changes in both the mean and standard deviation of the data. Changes in mean and/or in standard deviation will directly result in the change of the magnitude of design events. This can be seen from the well-known frequency factor formula in frequency analysis (Chow, 1951):



$$X_T = \bar{X} + K_T S$$

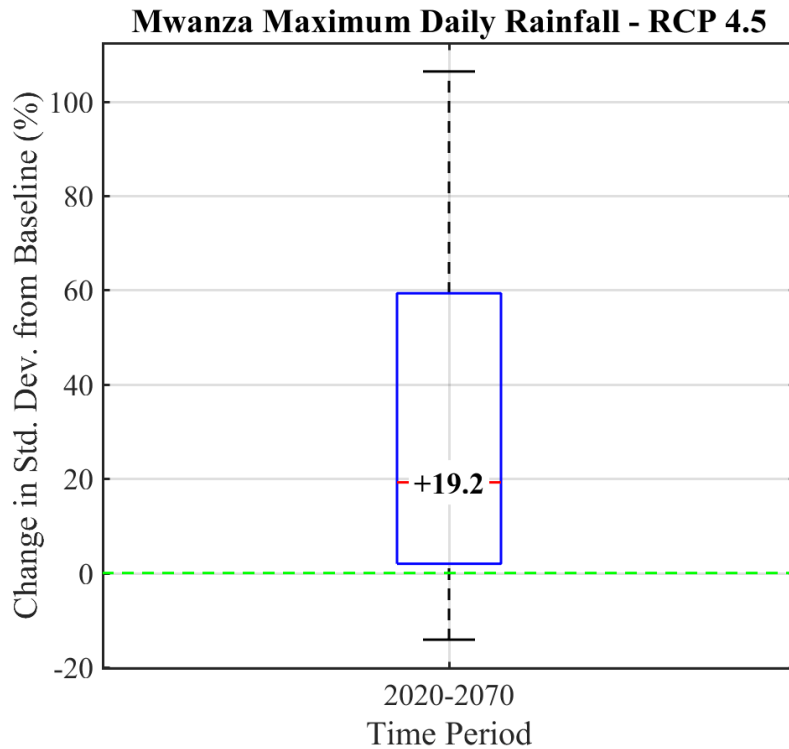
Where  $X_T$  is the design value at return period  $T$ ,  $\bar{X}$  and  $S$  are the mean and standard deviation of the variable  $X$ , and  $K_T$  is the frequency factor, which depends on the return period  $T$  and the distribution type. It is very clear from the above equation that the design values are directly affected by the changes mean as well as the standard deviation of the data.

**Figure 0-3** shows the boxplot of percentage change in the mean of the annual maximum daily rainfall from different models. The median value of the change is an increase of 11.5% in the mean of annual maximum daily rainfall.



**Figure 0-3: Projected percentage change in the mean of annual maximum daily rainfall.**

On the other hand, **Figure 0-4** shows the boxplot of percentage change in the standard deviation of the annual maximum daily rainfall. The median value of the change is an increase of 19.2% in the standard deviation of annual maximum daily rainfall.



**Figure 0-4: Projected percentage change in the standard deviation of annual maximum daily rainfall**

Based on the above projected changes in mean and standard deviation, the results of frequency analysis are adjusted for future changes by applying the changes in mean and standard deviations. The adjusted values are given in **Table 0-10** . Based on these results, an increase in the order of 15% on average in design depths is to be adopted.

**Table 0-10: Projected change in future values of design depths.**

T	Depth (mm)	Adjusted Depth (mm)	Change
2-y	82.5	92.2	11.8%
5-y	113.0	128.6	13.8%
10-y	134.5	154.2	14.6%
25-y	160.5	185.1	15.4%
50-y	179.7	208.0	15.8%
100-y	197.8	229.6	16.1%

### 1.2.5 Lag Time Calculations

The lag time is one of the main factors to calculating peak discharge. The standard lag is defined as the length of time between the centroid of precipitation mass and the peak flow of the resulting hydrograph. Examination of equations used in deriving the curvilinear unit hydrograph show that the lag time can be computed as the duration of unit precipitation divided by two plus 60% of the time of concentration.

As an approach to calculate the time of concentration for the catchments in rural areas, Bransby Williams equation was used. Bransby Williams equation reads:

$$T_c = 14.56 \times \frac{L}{A^{0.1} \times S^{0.2}}$$

Where:

Tc = Time of concentration (min)

L= horizontally projected length of drainage basin along the main water course (km)

A= Area of Drainage catchments (km<sup>2</sup>)

S= Average Basin Slope

### **Kirpich Equation**

For urban areas, Kirpich equation has been adopted. The Kirpich equation for time of concentration can be expressed as:

$$t_c = 0.0653 \frac{L^{0.77}}{P^{0.385}}$$

Where:

Tc Time of concentration (H),

L Longest flow path Length (km),

P Catchment area average slope (m/m).

The use of Kirpich formula is widespread in several countries. The relationship was originally developed from SCS data for well-defined and relatively steep channels draining small to moderate sized watersheds, but it often yields satisfactory results for overland flow on bare soils. *Rossmiller 1980* recommends that the estimated Tc should be multiplied by an adjustment factor to make the equation applicable in different Landuse type.

For urbanized areas, the adjustment factor is equal to 0.4.

### **Minimum Time of Concentration**

Although travel time from individual elements of a system may be as short as five minutes (inlet time to tertiary drainage system), the total nominal flow travel time to be adapted from any catchment to its point of entry into the primary drainage system should not be less than 10 minutes, (Queensland Urban Drainage Manual, 2007).

#### 1.2.6 Delineation

Delineation is used to define boundaries of the drainage basins, and/or to divide the drainage basins into sub-catchments. Delineation is a part of the process known as watershed segmentation, i.e., dividing the watershed into discrete land and channel segments to analyse watershed behavior.

Physical parameters of the drainage areas are very significant for the hydrologic analysis.

Based on the available topographic data, the physiographical characteristics of each basin were determined, in order to obtain all information concerning areas, altitudes, slopes, morphometric parameters, along with information concerning principal streams.

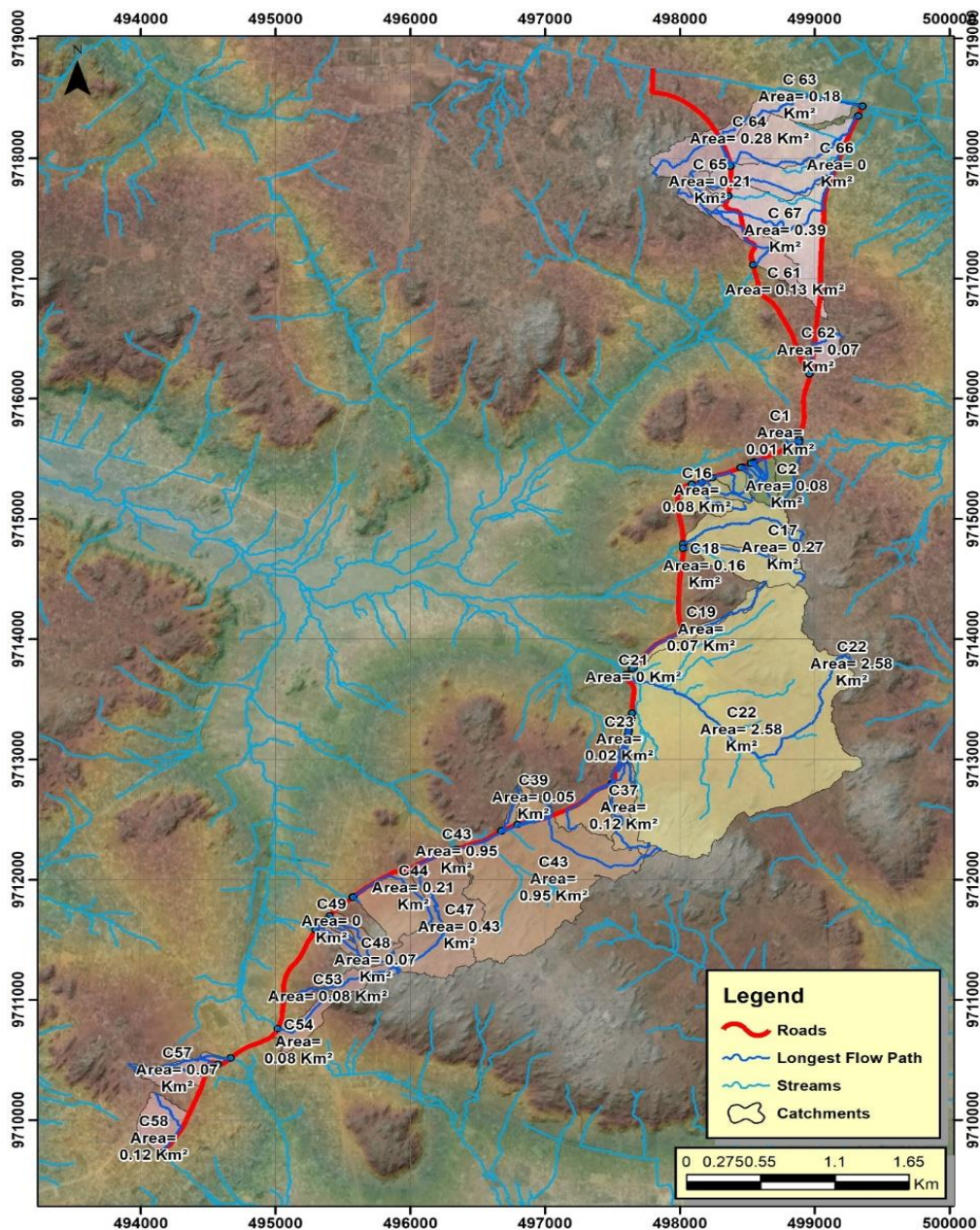
The Delineation was generated based on the DTM from SRTM, ALOS or the LIDAR data depends on the availability

Based on the above, the limits of the catchment areas of the watercourses boarding or crossing the site were delineated. Main streams are also traced as well as the maximum and minimum elevations along them. Catchment areas and the main course length are measured.

The Delineation was generated based on the DTM from the LIDAR data.

As such, the proposed drainage system along the project roads was designed aiming as much as possible at draining redirect storm flow discharge into the existing natural watercourses.

The main catchments are located east and southeast of the project site discharging its flow to Victoria Lake as shown in **Figure 0-5**.



**Figure 0-5: Catchment Delineation for Igoma Road and Catchment Areas**

### 1.3 Hydraulic design criteria

The next step after establishing the design flows from the hydrological analysis is to perform a hydraulic design for the different components of the drainage system. The hydraulic design is based on specified design criteria. The selection of design criteria depends on the physical nature of the area, future development, and economic considerations. The hydraulic analysis includes the calculation of water surface profiles for natural watercourses and the sizing of the proposed channels and conduits. The selection of design criteria for the drainage areas depend on its physical characteristics, its drainage problems, safety and benefits to users, as well as economic considerations.

### 1.3.1 Channel Sizing

As a first step in the hydraulic design after determining the route and the alignment of the proposed channels and conduits, longitudinal profiles were prepared applying the Soft Desk computer software for all the channels and conduits which are covered by the ground model.

The design slopes are proposed to match the natural ground slope as much as possible to minimize the earthwork meanwhile to keep the design velocities between the allowable limits.

The hydraulic design of the proposed channels and conduits is performed applying some of commercial software programs (Flow master, EPA SWMM and HEC RAS). The design velocities of the main drainage system are calculated based on the 10-year design flood.

For uniform flow conditions, the velocity in the channels and conduits is computed applying the Manning Formula as follows:

$$V = \frac{1}{n} R^{2/3} S^{1/2}$$

And  $Q = A * V$

Where:

A = Area of wetted cross section of the channel, m<sup>2</sup>

R = Hydraulic radius = A/P m

P = Wetted perimeter, m

S = Longitudinal slope of the channel, m/m

n = Manning roughness coefficient.

Roughness coefficient depends mainly on the soil type, vegetation intensity and whether the channel's course is meandering or straight as shown in **Table 0-11**.

**Table 0-11: Roughness coefficient for open channels**

Lining Type	Manning's Roughness	Side Slope (H:V)
Stone-pitching lined channels	0.020	1:1
Earth channels	0.025	2:1
Natural water course	0.045	2:1

### 1.3.2 Slopes

As far as possible, channels sloping would be a minimum of 0.1%, however due to mild gradient and lengthy alignment of channels; it is unavoidable to use even lesser slopes in the range of 0.05%-0.1%.

### 1.3.3 Velocity Limitations

The design velocities in the channels and conduits should be kept within a permissible range between maximum and minimum limits. The minimum allowable velocity is set to attain self-cleansing in the design channels while the maximum allowable velocity will keep the velocity below the scouring limit.

Such velocities are hard to maintain as they depend on the runoff in the channel. The amount of the runoff varies with the rainfall intensities and consequently a wide range of velocities can be expected to occur. Practice in the field of drainage has proven that there are certain maximum and minimum limits that should be considered in the design. The slope of the concrete channels/conduits is set to provide a minimum velocity of 0.75 m/s to maintain self-cleansing action. The maximum allowable velocity for concrete lined channels is set at 6.0 meters per second

at the 10-year design storm. For earth channels, a maximum velocity of 1.2 m/s is adopted in the design.

#### 1.3.4 Free Board

Freeboard is the vertical distance between the design water level and the top edge of the channel or conduit. The freeboard is a safety margin for carrying either higher frequency storms and to cater for the change of water surface due to wave action. The minimum adopted freeboard in the design of the proposed main channels is 25 cm. For street side drains, a minimum freeboard of 10 cm is adopted in the detailed design of the tertiary drainage system for the pilot areas.

#### 1.3.5 Drainage Structures Design Principles

The hydraulic design of drainage structures aims to provide structures of adequate capacities that could safely convey the design flow without significant damages or inconveniences.

The drainage structures include the following elements:

- Culverts
- Stream Bridges
- Open channels

##### 1.3.5.1 Culverts

Hydraulic design of culverts will follow the method of inlet/outlet control. Conceptual hydraulic design for the proposed culverts was also verified using the "Culvert Master" software. The preliminary sizing of these culverts is shown on the concept design drawings.

The method adopted for the dimensioning of the hydraulic structures is that of inlet and outlet controls developed by the "Office of Public Roads" and well known universally for the dimensioning of hydraulic crossing structures under the motorways. The method is described in details in "Hydraulic Design Series No. 5, Hydraulic Design of Highway Culverts" (1985) as prepared for the U.S. Federal

Highway Administration. Calculation will be carried out for the two types of control and then adopting the most critical mode, the one giving maximum head at inlet.

Hydraulic calculations of Box culverts will be carried out using the "Culvert Master" software developed by Haestad. This software is well known universally for the flow simulation in various drainage structures especially pipes and culverts. This model follows the same equations and charts and is able to calculate gradually varied flow profiles inside the culvert.

#### **Culvert Exit Velocity Limitation**

The outlet velocity may cause streambed scour and bank erosion for a limited distance in the downstream side of the culvert. As outlet velocities increase, the need for channel stabilization increases. Therefore, the maximum allowable velocity is limited to 6.0 m/s at the 25-year flood.

If the velocity exceeds the allowable limits, additional protection measures were proposed at the culvert outlets under consideration. The regular protection measure that was proposed at the outlet of some culverts along the section under consideration (for the case of non-exceeding exit velocity) is "loose riprap bed protection". The mean size of the riprap boulders (D50) of the mattress depends on the outlet flow velocity. The thickness of the protection layer is usually taken as 1.5 to 2 times (D50).

#### **Culvert Headwater**

The culverts generally constrict the natural stream flow, which results in a rise of the water surface in the upstream side. The headwater elevation for the design discharge should be at least 0.35m below the embankment edge, which corresponds to the thickness of the pavement layers.

For culverts with cross-sectional area equal to or less than 2.8 m<sup>2</sup>, HW/D should be equal to or less than 1.5 (at the design flow event).

For culverts with cross-sectional area greater than 2.8 m<sup>2</sup>, HW/D should be equal to or less than 1.2 (at the design flow event).

The maximum allowable headwater for major culverts is calculated based on the depth of water that can be ponded at the upstream end of the culvert during the 100 yr. event, which will be the minimum of one or more of the following constraints or conditions:

- (a) The allowable headwater must not damage upstream property.
- (b) The ponding depth is to be no greater than the lowest point in the road grade.

This headwater elevation shall be established to delineate potential flood zones.

To ensure self-cleansing during partial depth flow, culverts shall have a minimum velocity of 0.75m/s at design flow or lower, with a minimum slope of 0.25%.

- Culvert skews shall not exceed 45 degrees as measured from a line perpendicular to the roadway centerline.
- The minimum allowable culvert size is not less than 700mm to avoid clogging problems.
- The minimum allowable culvert size is not less than 700mm to avoid clogging problems.

#### 1.3.5.2 Stream Bridges

Stream Bridges were proposed on major wadies or perennial streams. The common practice is to conduct the hydraulic analysis on the bridges using the one-dimensional HEC-RAS hydraulic modelling software and the two-dimensional RMA2 Hydrodynamic model (if required in case of the existence of significant meandering effects). A bridge should always be put perpendicular to the flow. If the roadway/railway crosses a wadi at some angle, then the bridge should ordinarily be a skew bridge. Moreover, the abutments and bridge piers' alignment should be parallel to the flow direction. The following points will be considered:

- The depth of foundation At least = (2.67 ds -upstream water depth); where ds is the Lacey's normal scour depth. Other methods include CSU equation and FHWA NHI - 2001 guidelines.
- Regarding the freeboard, the max permissible water level should be at least 1.0m below the PGL.

### 1.4 Proposed mitigation measures

Igoma- Buhongwa road is connecting Igoma and Buhongwa districts west of Mwanza city, it's subjected to several streams from the east and southeast that cross the road

The adopted drainage system is to provide culverts at streams crossing points. In addition to that, a diversion channels will be provided at some locations to intercept the generated flows, direct it to the proposed culverts, and protect asphaltic roads against erosion.

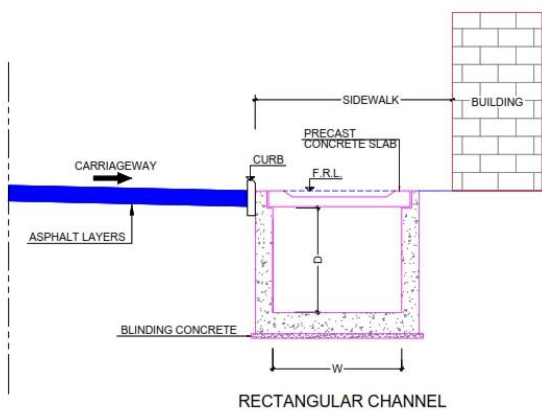
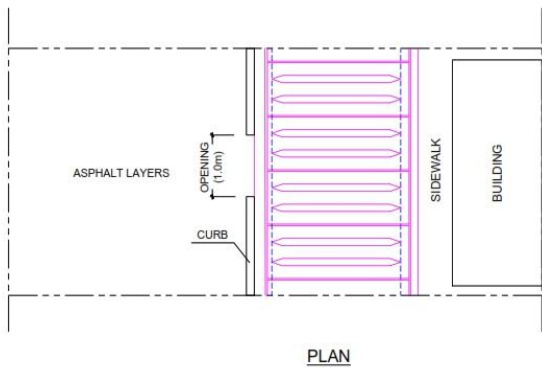
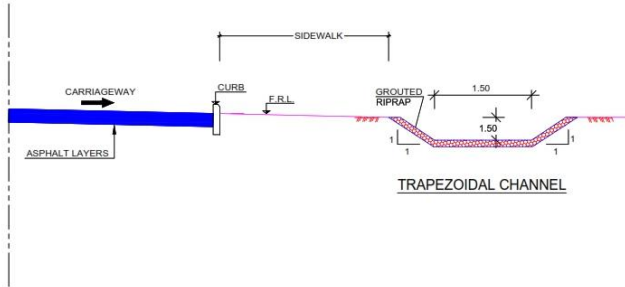
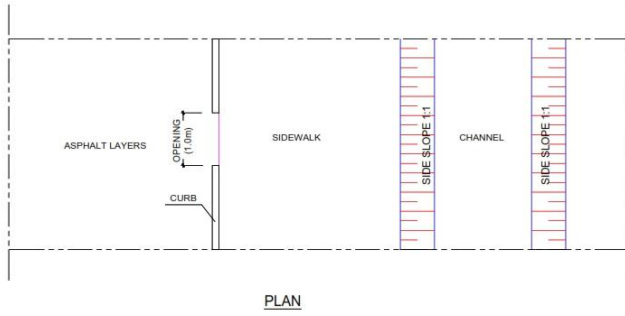
The surface water on roads will be collected through proposed closed ditches located under sidewalk or open channels beside road.

Catchments flows and the surface water will be directed to the proposed new culverts then to natural streams. Existing culverts will be maintained and extended.

Water will be intercepted through curb stones, 1.0 m openings were added to bypass the flow.

Locations where we have open spaces with no obstruction side open channels will be used while in case there are building beside road the closed ditches with grated cover shall be added under sidewalk.

Ditches section is rectangular and the open channels are trapezoidal.



**Figure 0-6: Cross-section for the used channels**



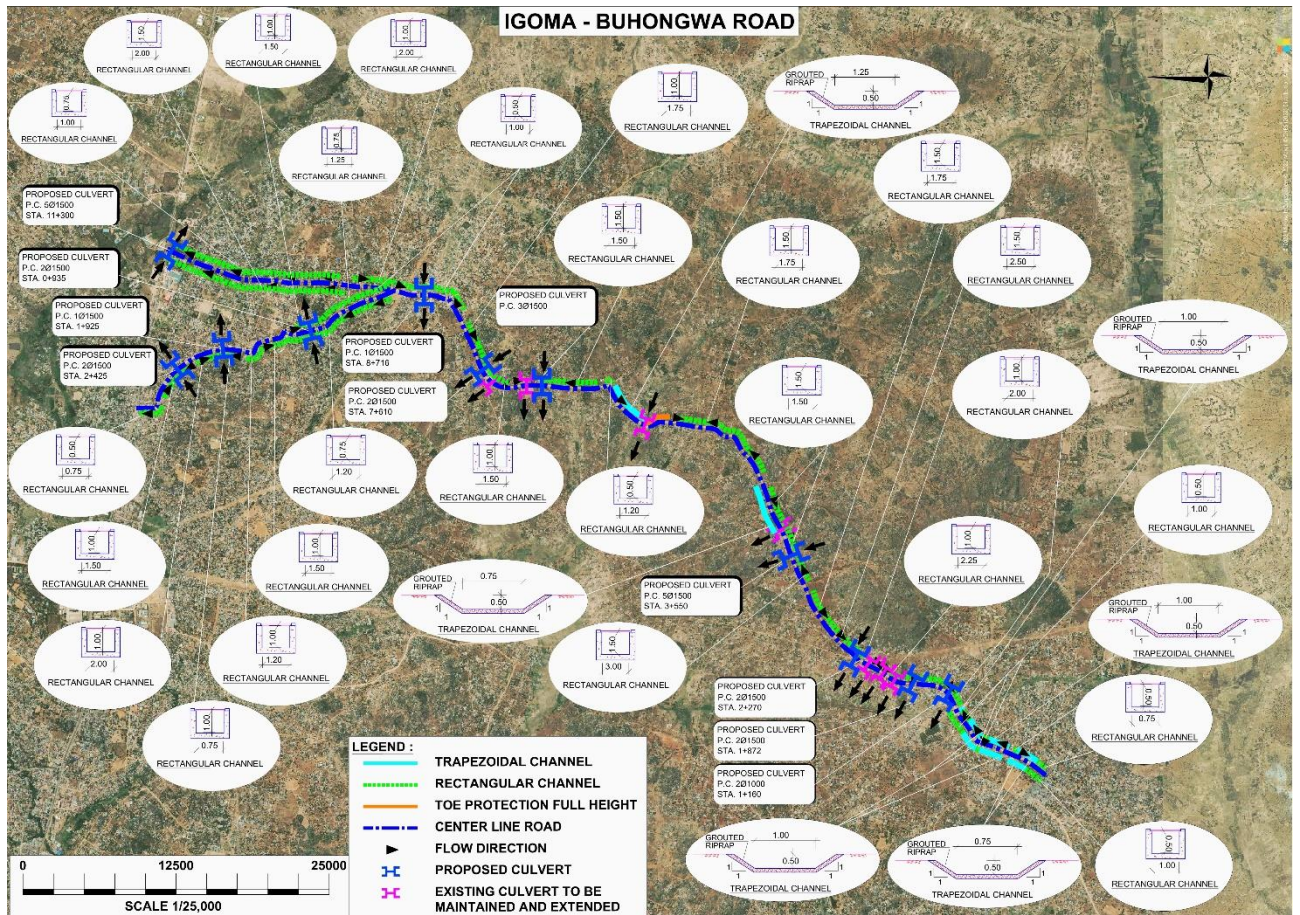


Figure 0-7: Proposed drainage system for Igoma-Buhongwa Road

Table 0-12: Catchments Areas and flows

CAT_ID	A (km <sup>2</sup> )	MSL (m)	MSS (m/m)	Tc (min)	C	Ditch	Culvert	I <sub>25</sub> (mm/hr)	Q 25yrs	Rat.
CA_01	0.120	505.000	0.052	16.38	0.4	1	1	231.51	3.07	
CA_02	0.031	255.000	0.042	9.90	0.4	2	1	278.55	0.94	
CA_03	0.130	787.534	0.075	23.57	0.4	3	2	194.56	2.79	
CA_04	0.021	100.000	0.070	3.64	0.4	3	2	278.55	0.64	
CA_05	0.032	150.530	0.081	5.11	0.4	4	2	278.55	0.97	
CA_06	0.055	625.071	0.081	20.08	0.4	5	3	210.94	1.28	
CA_07	0.053	628.303	0.042	23.14	0.4	5	3	196.45	1.15	
CA_08	0.099	337.892	0.042	11.68	0.4	6	3	264.33	2.90	
CA_09	0.106	1104.421	0.052	36.27	0.4	0	4	153.09	1.80	
CA_10	0.302	1937.004	0.042	59.84	0.4	0	4	108.80	3.63	
CA_11	0.106	1249.049	0.032	45.19	0.4	0	4	131.91	1.55	
CA_12	0.100	1079.901	0.033	39.03	0.4	8	4	146.04	1.62	
CA_13	0.066	1203.765	0.049	41.97	0.4	8	4	139.00	1.02	
CA_14	0.073	1017.226	0.078	32.04	0.4	8	4	164.67	1.34	
CA_15	0.061	1033.623	0.063	34.59	0.4	8	4	157.59	1.06	

CAT_ID	A (km2)	MSL (m)	MSS (m/m)	Tc (min)	C	Ditch	Culvert	I <sub>25</sub> (mm/hr)	Q Rat. 25yrs
CA_16	0.084	1089.380	0.052	36.70	0.4	8	4	151.97	1.40
CA_17	0.173	1053.652	0.028	37.37	0.4	8	4	150.24	2.87
CA_18	0.388	1810.000	0.050	52.70	0.4	8	4	118.04	5.05
CA_19	0.100	864.089	0.038	30.48	0.4	10	5	169.17	1.86
CA_20	0.035	222.799	0.015	10.55	0.4	10	5	273.80	1.06
CA_21	0.162	410.329	0.081	11.82	0.4	12	6	263.20	4.71
CA_22	0.064	297.895	0.081	9.43	0.4	13	6	278.55	1.96
CA_23	0.302	1504.039	0.048	45.36	0.4	14	7	131.55	4.39
CA_24	0.302	1504.039	0.048	45.36	0.4	15	7	131.55	4.39
CA_25	0.062	714.491	0.088	22.31	0.4	15	7	200.23	1.37
CA_26	0.072	1071.232	0.068	34.71	0.4	16	8	157.25	1.25
CA_27	2.398	2963.342	0.031	79.27	0.4	0	8	90.39	23.92
CA_28	0.598	1393.350	0.031	42.82	0.4	17	8	137.06	9.06
CA_29	0.840	2442.558	0.037	69.81	0.4	18	9	99.09	9.19
CA_30	0.840	2442.558	0.037	69.81	0.4	19	9	99.09	9.19
CA_31	0.250	1368.105	0.080	37.87	0.4	20	10	148.95	4.11
CA_32	0.139	1219.565	0.095	34.63	0.4	20	10	157.49	2.42
CA_33	0.052	789.599	0.115	23.81	0.4	21	10	193.47	1.10
CA_34	0.254	1723.453	0.066	49.56	0.4	22	11	123.36	3.46
CA_RD01	0.005	-	-	10	0.9	1	1	278.55	0.37
CA_RD02	0.003	-	-	10	0.9	2	1	278.55	0.22
CA_RD03	0.005	-	-	10	0.9	3	2	278.55	0.34
CA_RD04	0.003	-	-	10	0.9	4	2	278.55	0.23
CA_RD05	0.011	-	-	10	0.9	5	3	278.55	0.79
CA_RD06	0.014	-	-	10	0.9	7	3	278.55	0.95
CA_RD07	0.027	-	-	10	0.9	9	4	278.55	1.87
CA_RD08	0.012	-	-	10	0.9	10	5	278.55	0.81
CA_RD09	0.007	-	-	10	0.9	11	5	278.55	0.47
CA_RD10	0.009	-	-	10	0.9	12	6	278.55	0.65
CA_RD11	0.005	-	-	10	0.9	13	6	278.55	0.33
CA_RD12	0.004	-	-	10	0.9	14	7	278.55	0.26
CA_RD13	0.009	-	-	10	0.9	15	7	278.55	0.65
CA_RD14	0.009	-	-	10	0.9	16	8	278.55	0.64
CA_RD15	0.022	-	-	10	0.9	17	8	278.55	1.51
CA_RD16	0.012	-	-	10	0.9	18	9	278.55	0.82
CA_RD17	0.005	-	-	10	0.9	19	9	278.55	0.32
CA_RD18	0.014	-	-	10	0.9	20	10	278.55	0.94
CA_RD19	0.001	-	-	10	0.9	21	10	278.55	0.10

CAT_ID	A (km2)	MSL (m)	MSS (m/m)	Tc (min)	C	Ditch	Culvert	I <sub>25</sub> (mm/hr)	Q 25yrs Rat.
CA_RD20	0.015	-	-	10	0.9	22	11	278.55	1.03
CA_RD21	0.012	-	-	10	0.9	23	11	278.55	0.80
CA_RD22	0.005	-	-	10	0.9	24	12	278.55	0.35
CA_RD23	0.004	-	-	10	0.9	25		278.55	0.24
CA_40	0.016	-	-	10	0.5	26		278.55	0.62
CA_41	0.023			15	0.5	27		240.23	0.75
CA_42	0.017			15	0.5	28		240.23	0.55
CA_43	0.125457			20	0.4	29		211.33	2.93
CA_44	0.00675			10	0.4	30		278.55	0.21
CA_45	0.024			15	0.4	31		240.23	0.64

**Table 0-13: Sizes for proposed culverts**

ID	Area (km2)	Q <sub>25</sub> (m3/s)	SIZE	Road	Start Station
CU01	0.159	4.60	2x1500mm	RD2	2+425
CU02	0.191	4.98	2x1500mm	Main	1+872
CU03	0.232	7.07	2x1500mm	RD2	0+935
CU04	1.488	23.21	5x1500mm	Main	11+300
CU05	0.153	4.20	1x1500mm	Main	8+716
CU06	0.240	7.65	2x1500mm	Main	7+610
CU07	0.680	11.07	3x1500mm	Main	7+030
CU08	3.099	36.39	Existing Culvert 2x4x2 to be maintained		5+800
CU09	1.697	19.53	5x1500mm	Main	3+550
CU10	0.456	8.68	2x1500mm	Main	2+270
CU11	0.281	5.29	2x1000mm	Main	1+160

**Table 0-14: Sizes for proposed channels**

#	ID	Area (km <sup>2</sup> )	Q25 (m <sup>3</sup> /s)	S (%)	Trapezoidal open channel				Rectangular closed channel		
					SIZE(HxD)	Top Width (m)	Start Station (DS)	End Station (US)	SIZE(HxD)	Start Station (DS)	End Station (US)
1	DT01	0.125	3.44	0.59			2+425	2+825	1x1.50x1.00	2+425	2+825
2	DT02	0.034	1.16	0.30			2+425	2+270	1x1.25x1.00	2+425	2+270
3	DT03	0.156	3.77	0.35			1+925	2+270	1x2.00x1.00	1+925	2+270
4	DT04	0.035	1.21	1.40			1+925	1+705	1x1.00x0.75	1+925	1+705
5	DT05	0.119	3.21	3.50			0+935	1+705	1x1.20x1.00	0+935	1+705
6	DT06	0.099	2.90	0.50			0+935	1+100	1x1.50x1.00	0+935	1+100
7	DT07	0.014	0.95	0.35			0+935	0+000	1x1.20x0.75	0+935	0+000
8	DT08	0.946	14.37	1.60			11+300	9+485	1x2.00x1.50	11+300	9+485
9	DT09	0.027	1.87	1.70			11+300	9+485	1x1.00x0.75	11+300	9+575
10	DT10	0.147	3.73	0.30			8+730	9+485	1x2.00x1.00	8+730	9+485
11	DT11	0.007	0.47	0.50			8+730	8+205	1x1.00x0.50	8+730	8+205
12	DT12	0.172	5.36	1.80			7+610	8+205	1x1.75x1.00	7+610	8+205
13	DT13	0.068	2.29	0.85			7+610	7+300	1x1.50x1.00	7+610	7+350
14	DT14	0.306	4.66	2.40			7+030	7+300	1x1.25x1.00	7+200	7+300
15	DT15	0.374	6.42	0.50			7+030	6+430	1x1.50x1.50	6+850 6+675	6+720 6+625
16	DT16	0.081	1.90	3.50	1.25x0.50	2.25	5+800	6+430	1x1.20x0.50	6+325	6+425
17	DT17	0.620	10.57	2.50			5+800	4+260	1x1.75x1.50	5+580	4+425
18	DT18	0.852	10.01	1.40			3+550	4+260	1x1.50x1.50	3+550	4+260
19	DT19	0.845	9.52	0.30			3+550	3+200	1x3.00x1.50	3+250	3+541
20	DT20	0.403	7.47	0.55			2+270	3+200	1x1.75x1.50	2+750 2+725	3+150 2+750

										2+390	2+425
21	DT21	0.053	1.20	0.30			2+270	2+130	1x2.0x1.00	2+270	2+130
22	DT22	0.269	4.49	0.45			1+160	2+130	1x2.00x1.00	1+425	1+450
23	DT23	0.012	0.80	1.10	1.00x0.50	2.00	1+160	0+415	1x1.00x0.50	0+725 0+835 1+110	0+660 0+815 0+975
24	DT24	0.005	0.35	0.50	0.75x0.50	1.75	0+020	0+415	1x0.75x0.50	0+020	0+150
25	DT25	0.004	0.24	2.50	0.75x0.50	1.75	3+060	2+825	1x0.75x0.50	3+060	2+825
26	CA_40	0.016	0.62	0.5	0.75x0.50	1.75	0+200	0+415	1.0x0.50	0+020	0+200
27	CA_41	0.023	0.75	1.25	1.00x0.50	2.00	0+450	0+900	1.0x0.50	0+900	1+150
28	CA_42	0.0165	0.55	2.5	0.75x0.50	1.75	4+325	3+830	-	-	-
29	CA_43	0.125	2.93	2.6	-	-	-	-	1.25x0.75	0+360	0+927
30	CA_44	0.00675	0.21	0.3	-	-	-	-	0.75x0.50	0+00	0+160
31	CA_45	0.024	0.64	0.3	-	-	-	-	1.00x0.50	0+350	0+160

## **Appendix VII: Geotechnical Study Report**

### **1 GEOTECHNICAL**

#### **1.1 Introduction**

The President's Office, Regional Administration and Local Government (PO-RALG) has received a fund from the World Bank under the umbrella of the World Bank-financed Tanzania Cities Transforming Infrastructure and Competitiveness Project (TACTIC), implemented through the PORALG to support of urban management performance and deliver improved basic infrastructure and services in participating urban local government authorities. The President's Office, Regional Administration and Local Government (PO-RALG) (the Client), Tanzania, invited the Specialized Consultants to submit their proposals to undertake the Consultancy Services for the Feasibility Study, Urban Design, Detailed Engineering Design, Environmental and Social Due Diligence, Preparation of Cost Estimates and Bidding Documents for Urban Infrastructure Investments in Mwanza, Ilemela, Geita and Kahama Cities/Municipalities/Towns (Tactic Zone 2). As such, Dar as one of the main Consultants working in Tanzania with vast experience in urban design and infrastructure projects submitted comprehensive technical and financial offers that got the highest evaluation and accordingly, the project has been awarded to Dar.

The project includes 15 Subprojects distributed among the four Cities as follows:

Mwanza:

1. Mkuyuni Fish Market
2. Rehabilitation of Mirongo River (to mitigate flooding in the downstream)
3. Construction of Igoma-Buhongwa Road (14 km), part of the ring road that is economically critical for Mwanza

Ilemela:

1. Kirumba Central Market, surrounding access roads (2.9 km)
2. Buswelu - Busenga - Coca Cola Road/Musoma Road at Igoma (3.3 km)
3. Buswelu-Nyamadoke-Nyamhongolo Road (9.5km)

Geita:

1. Mkolani-Mwatulole Road (5.9 km)
2. Nyankumbu to Kivukoni Secondary school Road (3.9 km)
3. 6 km of access roads and drainage for SMEs Industrial area (including Simb-Emmamkengele-Mwabasabi Road + Nguzo mbili Samanolio Road)
4. Construction of Magogo Bus Terminal

Kahama:

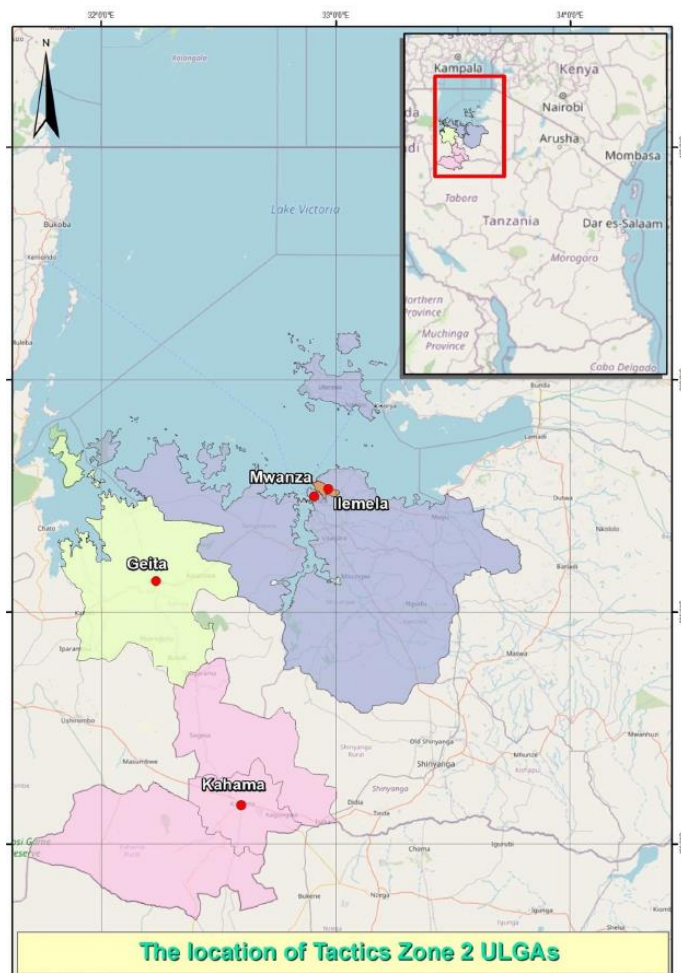
1. Zongomela industrial area upgrading (12.6 km of access roads, minibus stand, and commercial area)
2. Improvement of approximately 7 km roads at Kahama Central Business District (CBD)
3. Construction of Bus Terminal at Mbula
4. Construction of 3 km Storm Water Drain
5. Upgrading of Sango Market

The main aim of this section of the report is to illustrate the adopted geotechnical design basis, design criteria, and geotechnical design and recommendations that will be used for the road design/construction and for foundation recommendations of the buildings constructed in **Mwanza**

**City**; that would satisfy the Building function; type; shape and fulfil the geotechnical requirements of safety, stability, serviceability and durability.

## 1.2 Project Location

The project includes the LGAs of Mwanza, Ilemela, Geita and Kahama that are located at the northern part of Tanzania as shown in Figure 1.



**Figure 8: Location of tactic zone 2**

**Geita** is a town in northwestern Tanzania, with a population of 99,795 (2012 census). It is located in the center of a gold mining area. In March 2012 it became the administrative headquarters of the newly created Geita Region.

**Kahama** is a town in north-western Tanzania. The town serves as the headquarters of Kahama Urban District. Kahama is located in the Kahama District of the Shinyanga Region. The town is approximately 536 kilometres by road, north-west of Dodoma, the capital of Tanzania.

**Mwanza City** comprises of Nyamagana and Ilemela Districts. In 2000, Nyamagana District attained the City status and since then it is referred as Mwanza City which is ruled by the City Council.

Mwanza city is located on the southern shores of Lake Victoria in Northwestern Tanzania.

**Ilemela District** is largely rural, and it is ruled by Municipal Council. The city has 37 wards of which

18 wards are in Nyamagana district and 19 wards in Ilemela district. In addition to that, the city has smaller administrative units classified into sub-wards (Mitaas), villages and sub-villages (vitongoji).

### 1.3 Geological Study

The geologic setting of Tanzania is represented by several major litho-structural provinces that include different types of rocks and range in age from the Archean to the Recent. The Precambrian basement rocks cover most of the western two thirds of the country and consist mainly of Igneous and metamorphic rocks of Tanzanian Craton. The Phanerozoic is characterized by a series of sedimentary units of Paleozoic to Mesozoic age (at western and eastern borders) which are followed by Cenozoic intrusive and extrusive phases that accompanied the active rifting phase. (Semkiwa et al., 2005).

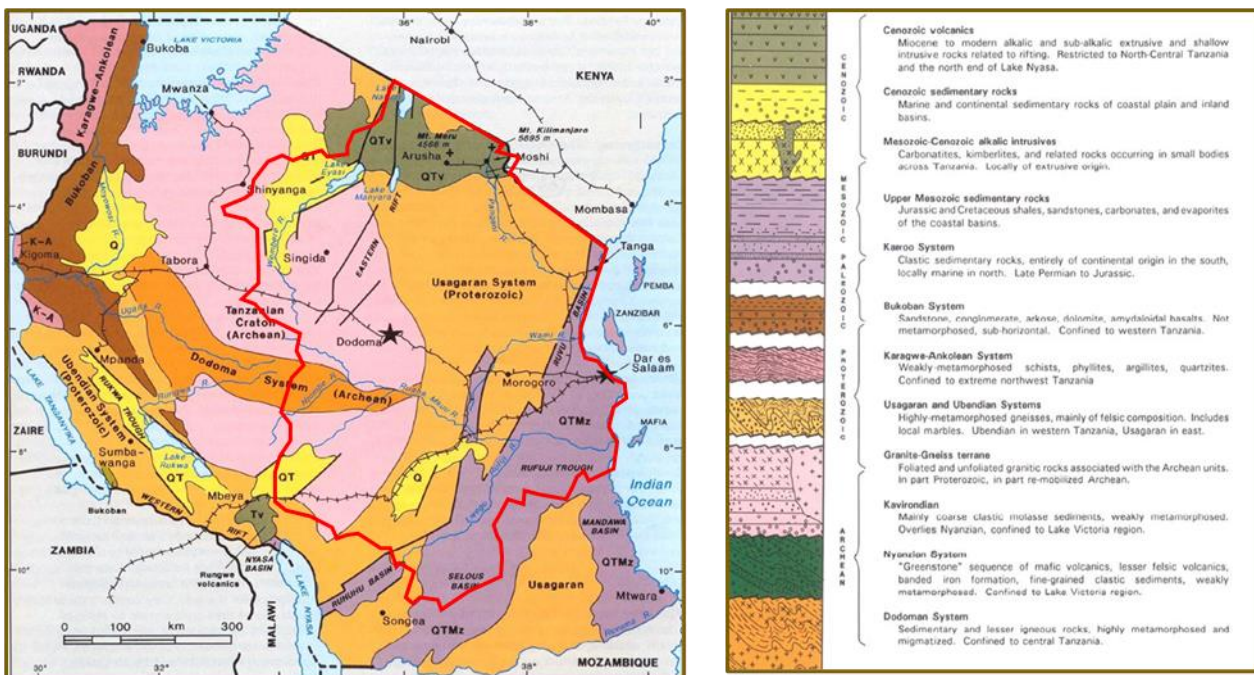
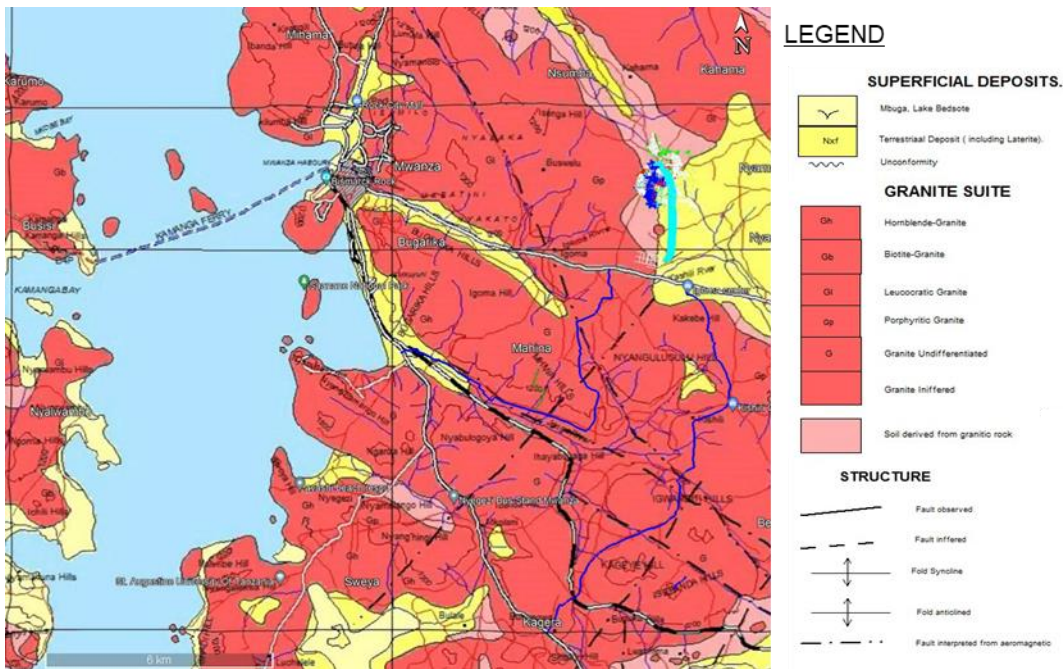


Figure 9: Google Earth satellite Images showing the site history of the project area.

#### 1.3.1 General Geological Setting of Mwanza

The City of Mwanza is located in the north western part of Tanzania to the south of Lake Victoria. Mwanza is characterized by flat to undulating topography with isolated hills of different elevations that are dissected by subparallel northwest-oriented valleys/wadis. The rock units of the Mwanza area form a part of the Tanzanian Craton which is composed mainly of; Crystalline basement rocks (Granitic rocks) of Precambrian age and quartzite metamorphic rocks outcropped at places. These rocks are partially covered by Tertiary to Quaternary soil layers. Joints and foliation are the most common discontinuities in the project area and the rocks are affected by two sets of faults oriented in NW and NE directions. Regarding the elevations, Mkuyuni-Fish Market is on an elevation ranging from 1133m to 1138m MSL. For the culverts in Mwanza - Mirongo River, the culverts are on an elevation ranging from 1133m to 1161m MSL.





**Figure 10: Geologic map of Mwanza and Ilemela, Geological Survey of Tanzania, 2002. (Scale 1:100,000)**

### 1.3.2 Potential Geological Constraints

Based on the desk study of the available geological data, the following geological concerns are revealed to be considered:

i. Problematic soil

- The lateritic soil is weak, swampy, collapsible and contains dissolution cavities, in many places.
- The black clayey soil may have swelling/shrinking properties.

ii. Soil aggressiveness

- Mwanza is located close to the Lake Victoria. Hence, the potential corrosiveness of the soils throughout the project areas should be investigated in detail to define the soil properties.

iii. Seismicity

- The project areas are located in a low to moderate seismic zone. However, national, and international seismic codes and standards should be followed in the detailed design stage

### 1.4 Subsurface Investigation

The provided investigations cover the logs in-situ and laboratory test results of samples taken in 11 boreholes and 31 trial pits in the study area.

- 6 Boreholes were drilled to 10m depth (M-BH-01 & M-BH-04 + N-CU-01 to N-CU-05) and 2 BHs (M-BH-02 & M-BH-05) were drilled to 15.0m depth and one BH was drilled to 13.5m depth, logged, sampled and in-situ SPT measurements taken at about 1.0m interval wherever possible, till refusal conditions with N values >50.

Photographs of the cored samples were taken to correlate with the written logs.

- Samples of soil, broken rock and ground water were taken for classification, strength and chemical analysis to confirm the site observations and measurements.
- Trial pits were excavated to 3m depth wherever possible and logged and photographed. Samples were taken for classification and CBR strength tests.

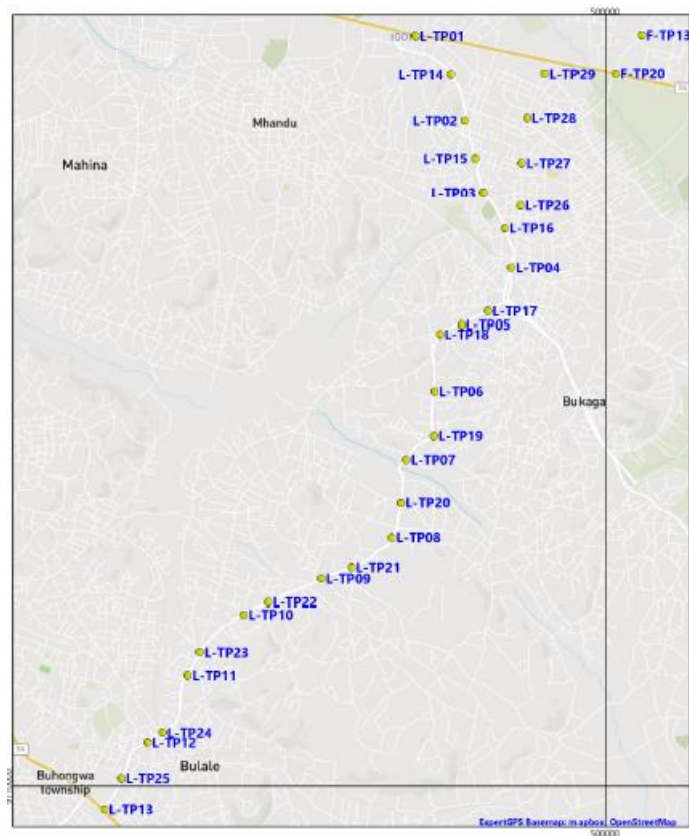
- Permeability tests performed in selected boreholes
- Piezometers was provided in selected boreholes for further monitoring.

Test pits are usually excavated to a depth of 3.0m. However, the excavation of the trial pit shall be stopped in case of some restrictions such as ground water, hard rock or concrete.

#### 1.4.1 MWANZA

##### **Performed Site investigation**

For the Mirongo River location, 5 boreholes of depth 10m (N-CU-01 to 05) were drilled in the locations of the box culverts in the crossing of the drain channel with the existing roads. 29 test pits were excavated along the road of Mwanza-Igoma-Buhongwa-Road (L-TP-01 to L-TP-29) with depths range up to 3.0m.



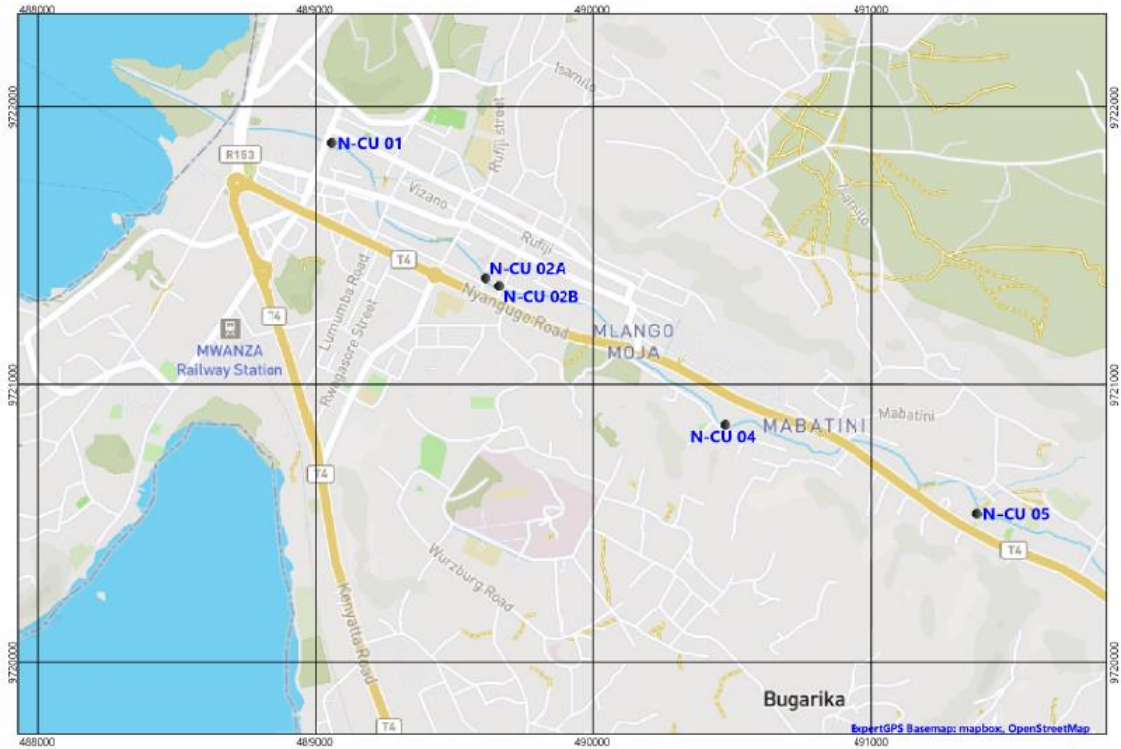


Figure 11 : Layout and coordinates of the Site investigation program in Mwanza area

ID	Easting	Northing	Depth	Area	
L-TP01	497,795.25	9,718,743.70	0.9	Mwanza	Igoma - Buhongwa Road
L-TP02	498,368.98	9,717,758.21	2.4	Mwanza	Igoma - Buhongwa Road
L-TP03	498,586.07	9,716,913.87	2	Mwanza	Igoma - Buhongwa Road
L-TP04	498,914.95	9,716,027.54	1.7	Mwanza	Igoma - Buhongwa Road
L-TP05	498,333.39	9,715,375.59	3	Mwanza	Igoma - Buhongwa Road
L-TP06	498,017.19	9,714,610.04	2.9	Mwanza	Igoma - Buhongwa Road
L-TP07	497,689.28	9,713,794.21	2.2	Mwanza	Igoma - Buhongwa Road
L-TP08	497,518.48	9,712,889.55	1	Mwanza	Igoma - Buhongwa Road
L-TP09	496,698.58	9,712,412.14	0.6	Mwanza	Igoma - Buhongwa Road
L-TP10	495,793.21	9,712,010.16	2.9	Mwanza	Igoma - Buhongwa Road
L-TP11	495,136.50	9,711,287.48	2.6	Mwanza	Igoma - Buhongwa Road
L-TP12	494,665.07	9,710,509.27	3	Mwanza	Igoma - Buhongwa Road
L-TP13	494,162.60	9,709,733.50	3	Mwanza	Igoma - Buhongwa Road
L-TP14	498,205.23	9,718,296.94	2.5	Mwanza	Igoma - Buhongwa Road
L-TP15	498,491.94	9,717,314.86	2.7	Mwanza	Igoma - Buhongwa Road
L-TP16	498,836.67	9,716,492.06	2.8	Mwanza	Igoma - Buhongwa Road
L-TP17	498,642.82	9,715,528.46	2.85	Mwanza	Igoma - Buhongwa Road
L-TP18	498,082.82	9,715,270.49	2.5	Mwanza	Igoma - Buhongwa Road
L-TP19	498,011.20	9,714,074.27	2.1	Mwanza	Igoma - Buhongwa Road
L-TP20	497,626.74	9,713,296.62	0	Mwanza	Igoma - Buhongwa Road
L-TP21	497,048.12	9,712,541.94	3	Mwanza	Igoma - Buhongwa Road
L-TP22	496,074.80	9,712,144.56	2.5	Mwanza	Igoma - Buhongwa Road
L-TP23	495,277.35	9,711,558.27	2.87	Mwanza	Igoma - Buhongwa Road
L-TP24	494,844.97	9,710,622.71	0.8	Mwanza	Igoma - Buhongwa Road

L-TP25	494,359.13	9,710,091.95	1.3	Mwanza	Igoma - Buhongwa Road
L-TP26	499,019.75	9,716,754.36	2.9	Mwanza	Igoma - Buhongwa Road
L-TP27	499,036.53	9,717,260.15	2.93	Mwanza	Igoma - Buhongwa Road
L-TP28	499,100.45	9,717,786.40	2.4	Mwanza	Igoma - Buhongwa Road
L-TP29	499,303.66	9,718,301.15	2.8	Mwanza	Igoma - Buhongwa Road
N-CU-01	489,055.13	9,721,870.04	10.5	Mwanza	Mirongo River
N-CU-02A	489,608.45	9,721,382.53	10.3	Mwanza	Mirongo River
N-CU-02B	489,657.82	9,721,354.12	10.5	Mwanza	Mirongo River
N-CU-04	490,468.82	9,720,856.23	10.5	Mwanza	Mirongo River
N-CU-05	491,379.53	9,720,534.20	10.5	Mwanza	Mirongo River

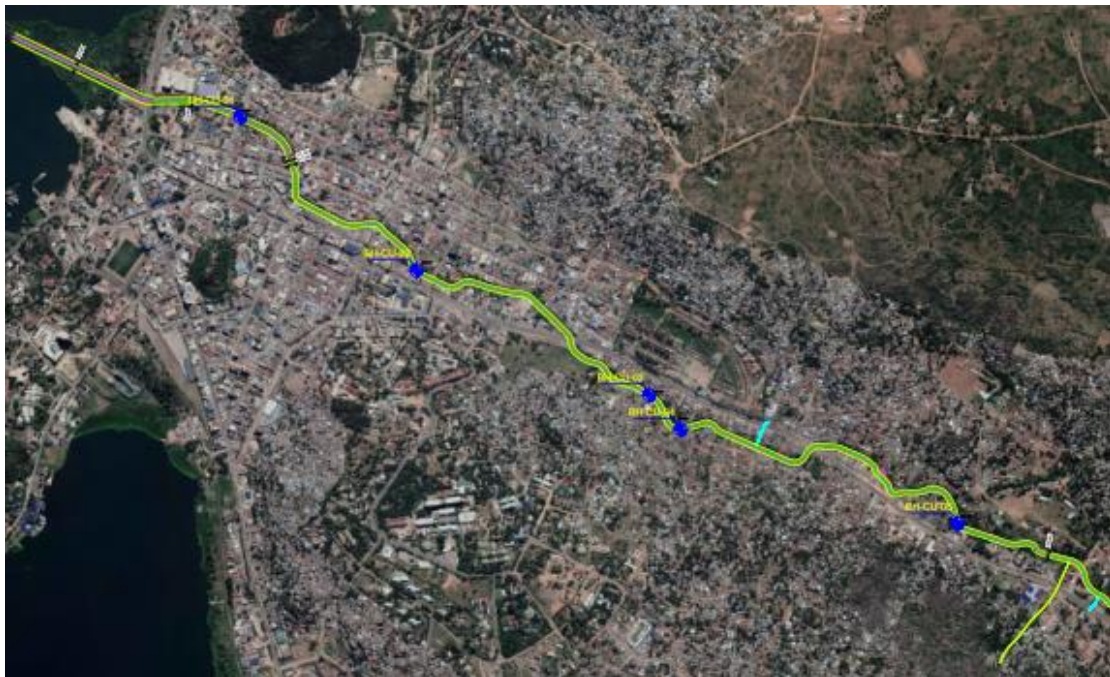
Trial pits less than 2.7m had restrictions such as groundwater, hard rock or concretes detailed on the logs

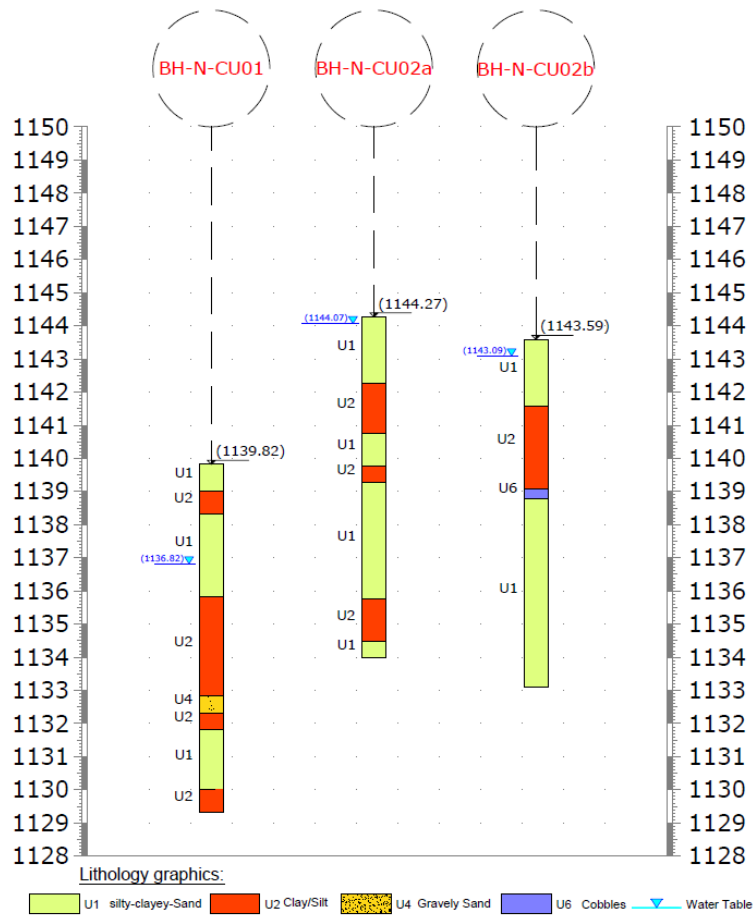
### **Soil Stratigraphy**

The soil in the provided boreholes in MWANZA consists mainly of:

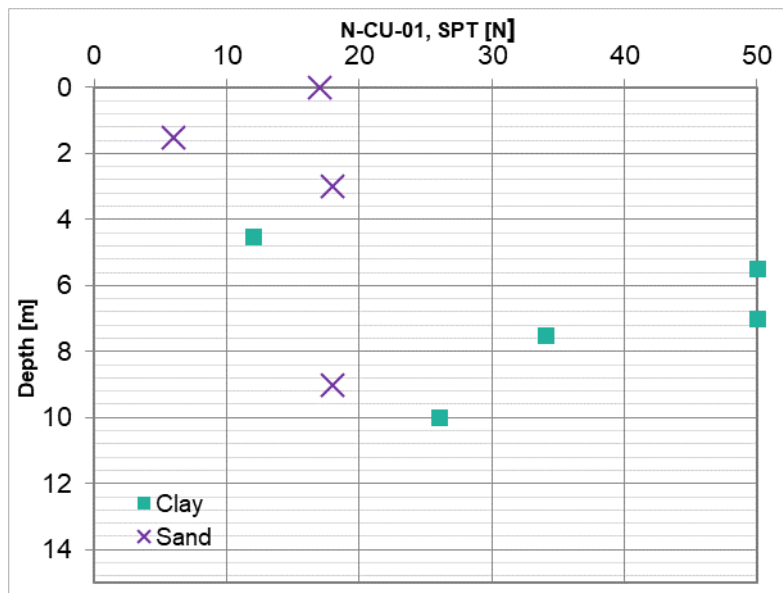
#### **Mwanza - Mirongo River**

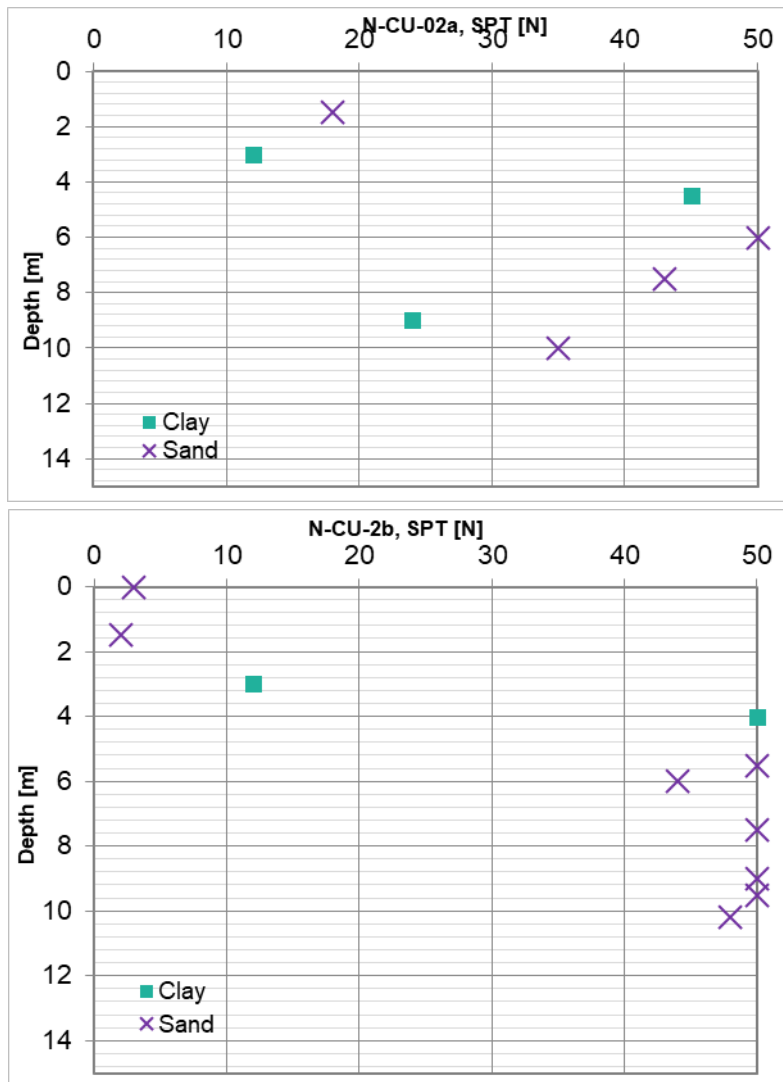
- 5 boreholes were drilled along the river at the location of each box culvert for the crossing of the drain channel along the existing road ways.
- The first three box culvert locations have nearby elevations in the range from 1139 (N-CU-01) to 1144 (N-CU-02a). The soil generally consists of 3.0m upper loose to medium dense Sand (N = 2 to 18) and rubbish (down to 1.5m in N-CU-02a), then underlain by hard (N=11) to very stiff (N >50) Clay (low to intermediate plasticity), and medium to very dense Sand layers (N = 18 to >50).
- The compression index,  $C_c$ , of the lower clay ranges from 0.125 to 0.179,  $C_{c\text{ avg}} = 0.149$  and  $C_{r\text{ avg}} = 0.024$ .





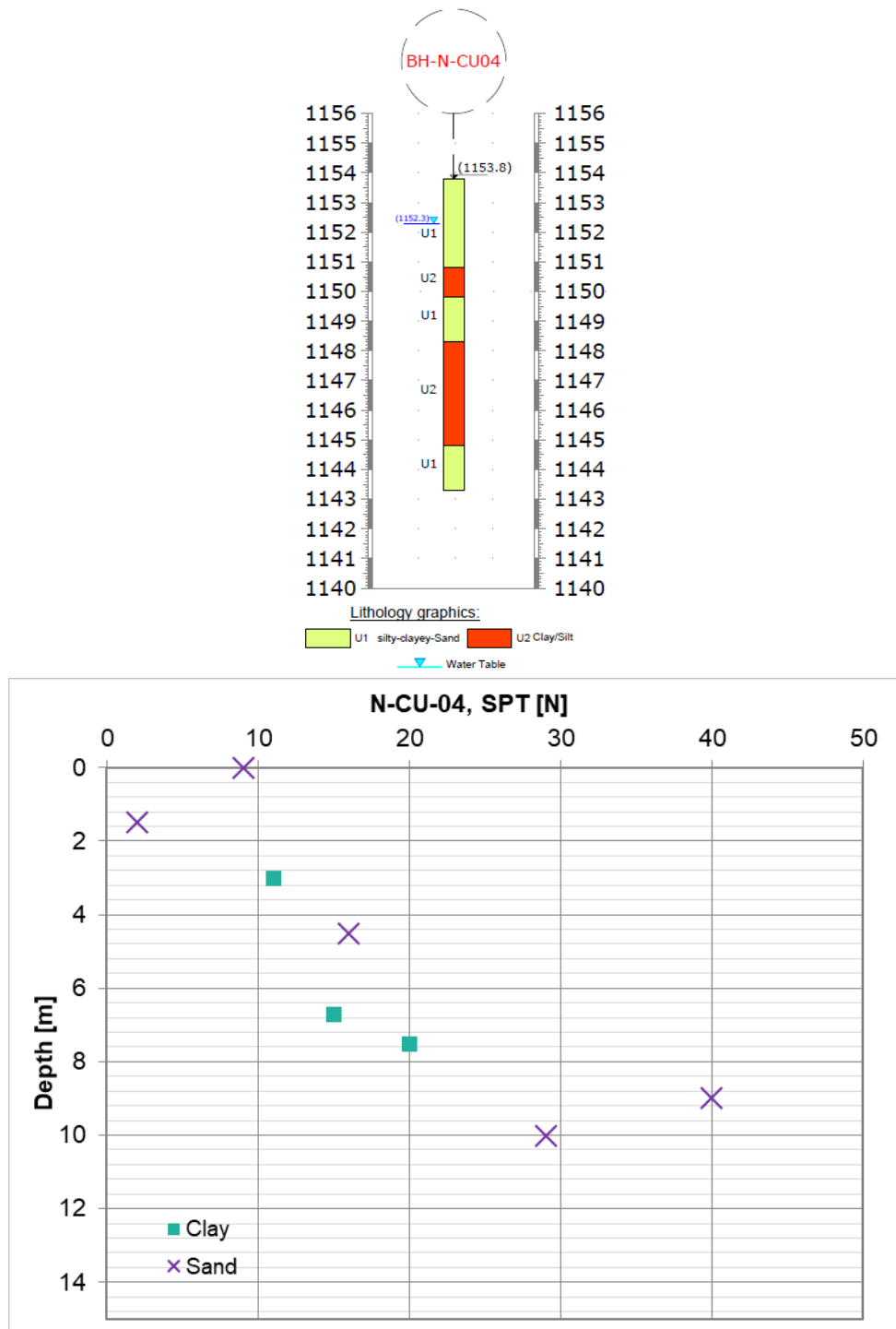
**Figure 12: Borehole logs for the boreholes at box culverts BH-N-01, N-CU-02a, & N-CU-02b**





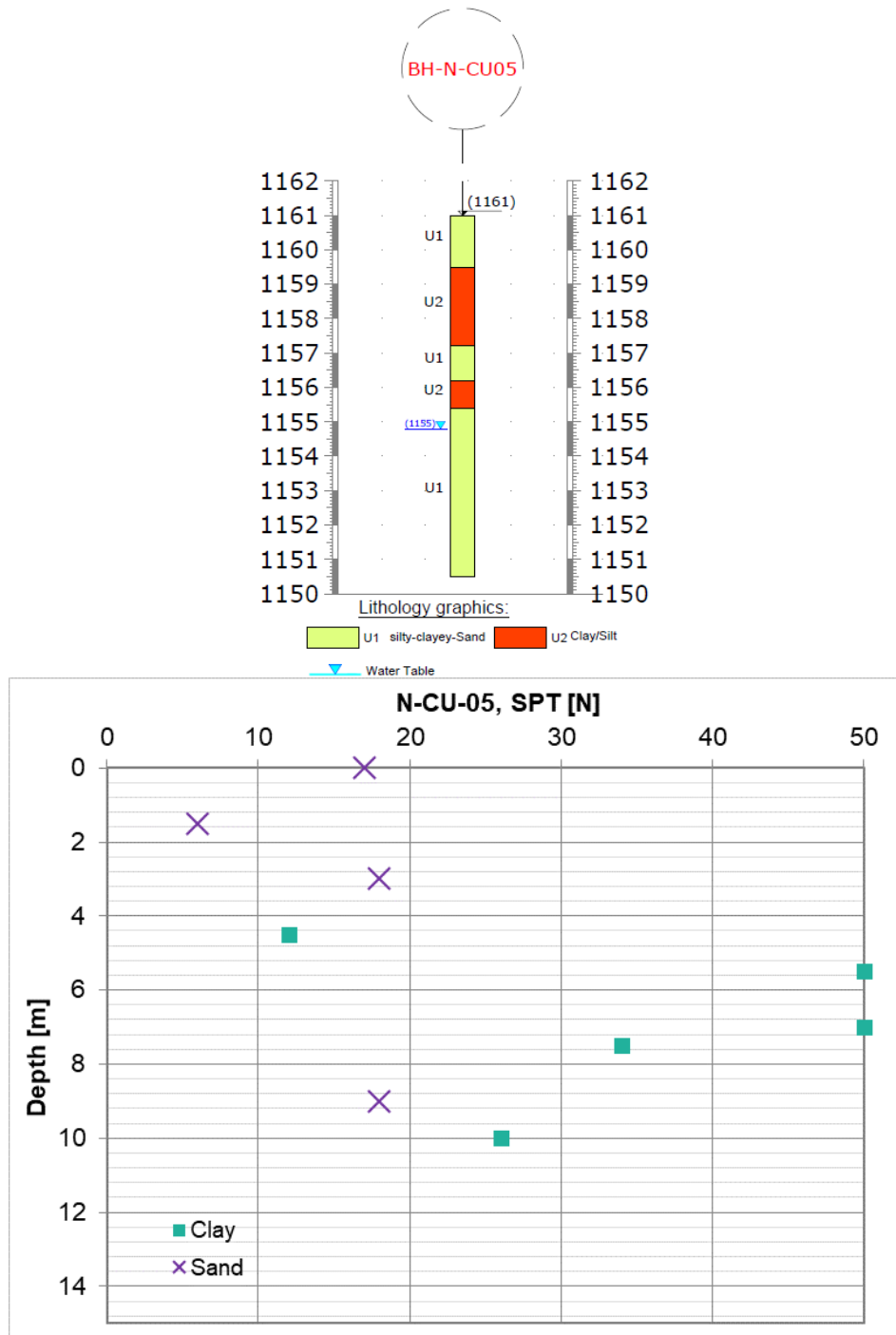
**Figure 5: N-SPT with depth for the boreholes of culverts at N-CU-01, N-CU-02a, N-CU-02b**

- The 4<sup>th</sup> box culvert location BH has an elevation 1153.6m. The soil consists of 3.0m upper loose Sand (N = 2 to 9), then underlain by 1.0m stiff (N=11) to very stiff Clay (N=15 to 20), and medium to dense Sand layers (N = 16 to 40) intercalated by 2.3m very stiff lower clay (intermediate plasticity).
- The compression index,  $C_c$ , of the lower clay is  $C_c = 0.211$  and  $C_r = 0.056$ .



**Figure 6: Borehole log and N-SPT with depth for the borehole of culverts at N-CU-04**

- The 5<sup>th</sup> box culvert location BH has a top elevation 1161m. The soil consists of 1.5m upper loose to medium dense Sand (N = 4), then underlain by 2.8m firm (N =6,  $E_{oed} = 6.25\text{MPa}$ ) to stiff Clay, and medium to very dense Sand layers (N = 14 to 48) intercalated by 0.8m very stiff lower clay (intermediate plasticity).
- The compression index,  $C_c$ , of the lower clay (0.8m thick) is  $C_c = 0.189$  and  $C_r = 0.05$ .

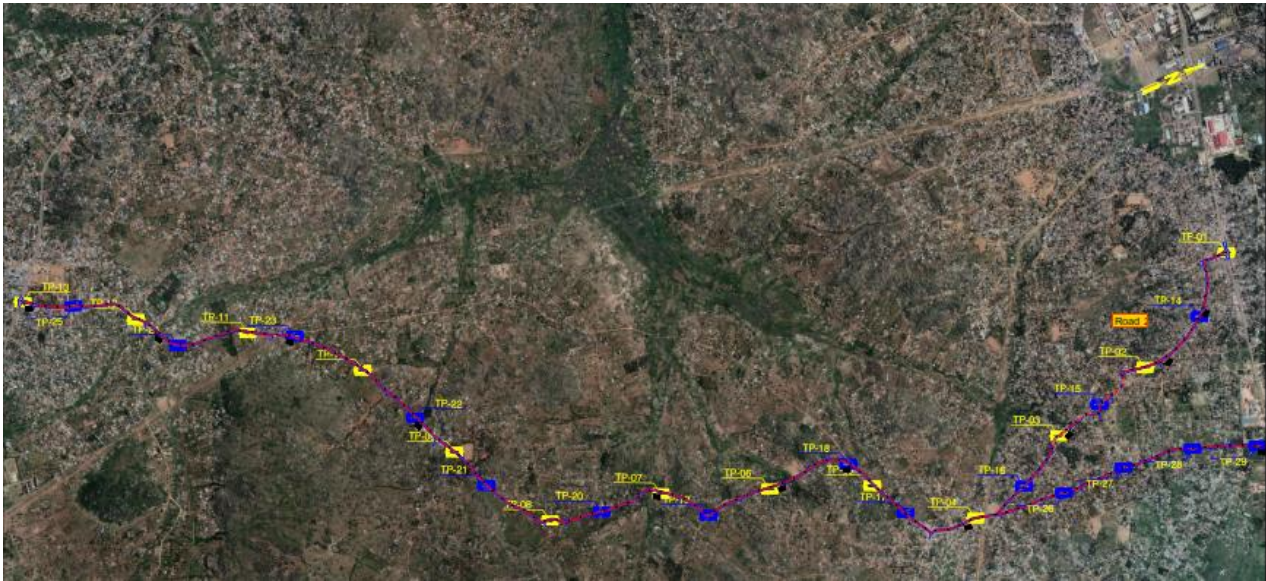


**Figure 7: Borehole log and N-SPT with depth for the borehole of culverts at N-CU-05**

**Mwanza-Igoma-Buhongwa Road**

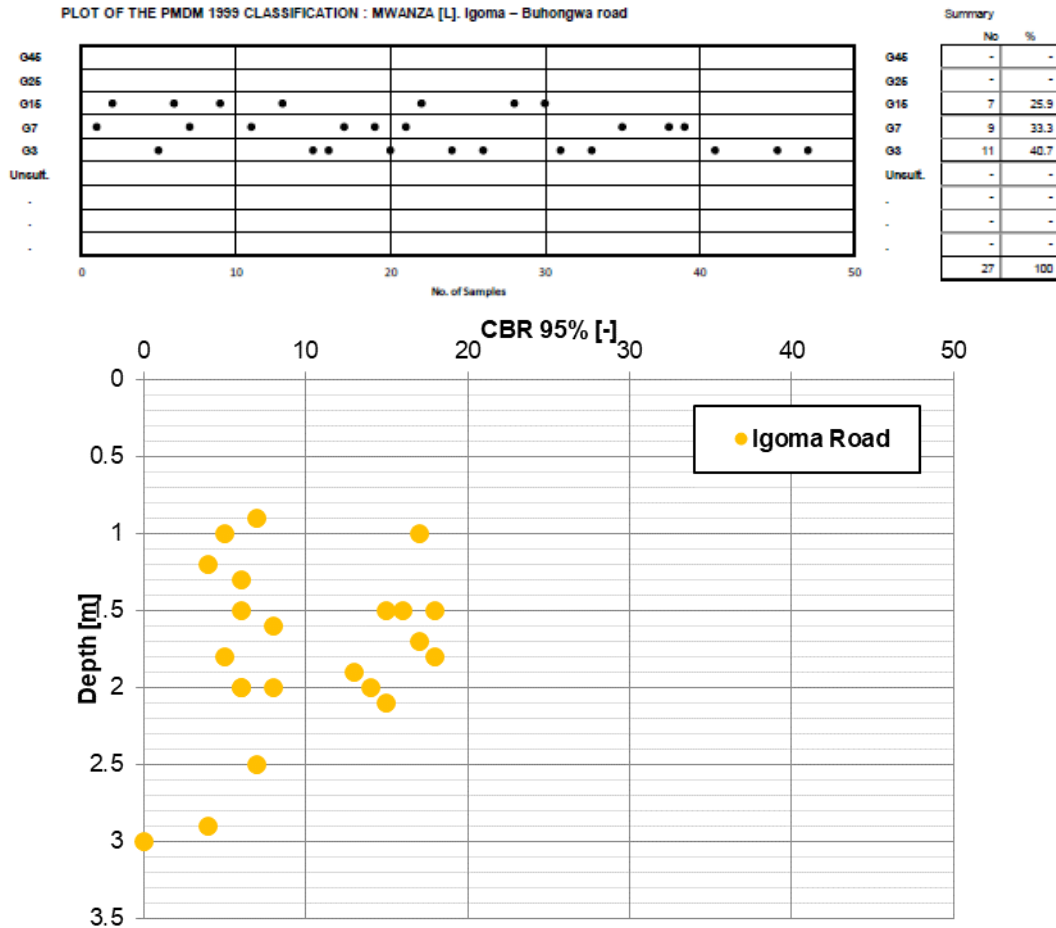
- 29 test pits were excavated along the alignment of the road (L-TP-01 to L-TP-29)



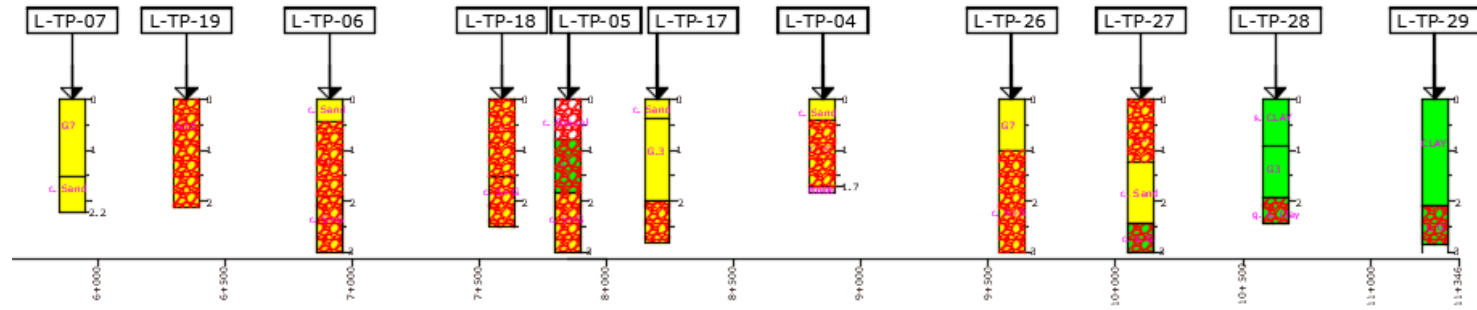
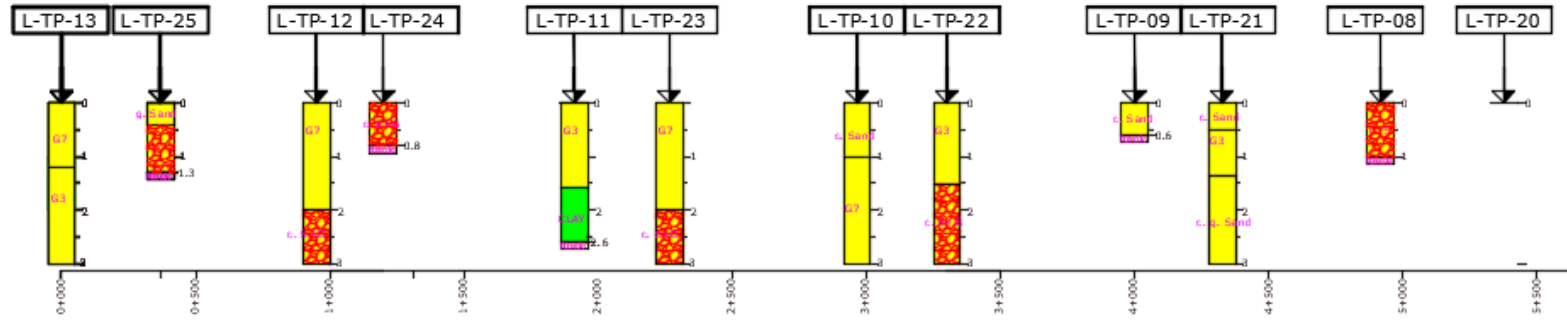


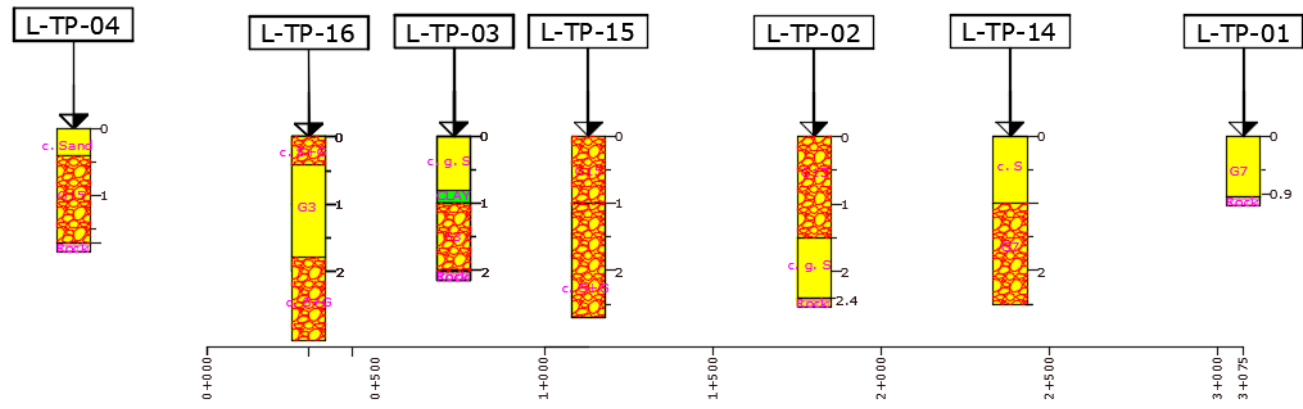
- From L-TP-01 to L-TP-09, the soil is dry grey silty Sand with fine gravel combined with loose waste material or silt and Clay layers CBR 95% values are from 13 to 15, the upper layers to depth 0.4m to 0.6m were combined with plant roots and organic materials. The upper layers with roots and waste materials are needed to be removed and replaced.
- Rock layers were encountered at depths from 0.9m to 2.40m
- From L-TP-10 to L-TP-13 (St0+000 to 3+800), the soil is dry gravelly/sandy /silty Sand with CBR 95% values are from 4 to 8. Rock was encountered at L-TP-11 (ST 2+150 to 2+550) at depth 2.6m.
- From L-TP-14 to L-TP-27, the soil is clayey Sand and Gravel at the upper layer of depth from 0 to 2.0.0m (with rubbish to 0.5m at L-TP-14), underlain by sandy Gravel to the end of test pit, rock appears in some test pit at depth 0.8m (L-TP-24) and 1.3m depth (L-TP-25). CBR 95% values are in the range from 5 to 14.
- Sandy Clay appears in L-TP-28 & L-TP-29 with CBR =3 and PI 15 to 26%.
- G3 type sands and Gravels were encountered on Igoma – Buhongwa road. No replacement is needed at TP-20 (St. 4+600 to 5+600), only scrapped of the upper layer and well compaction for the bed is needed.
- Rock depths for Igoma - Buhongwa Road 2 are:
  - L-TP-03: rock depth =2.00m, ST. 0+825
  - L-TP-02: rock depth =2.40m, ST. 1+800
  - L-TP-01: rock depth =0.90m, ST. 3+075 (end of Road chain)
- Rock depths for Igoma - Buhongwa Road 1 are:
  - L-TP-09: rock depth =0.60m, ST. 3+950
  - L-TP-08: rock depth =1.00m, ST. 4+950
  - L-TP-07: rock depth =2.20m, ST. 5+900
  - L-TP-04: rock depth =1.70m, ST. 8+850
  - L-TP-25: rock depth =1.30m, ST. 0+425
  - L-TP-24: rock depth =0.80m, ST. 1+200

- The CBR at 95% is shown below with depth. The soil classification on the trial pit samples as per PMDM 1999 classification is shown below, the soil is classified G3, G7 and G15, clayey Sands/Gravels. The unsuitable soil is limited in L-TP-28 & L-TP-29 (ST. 10+600 to 11+200) where clay soil is encountered.
- In addition, **Appendix A** shows the full lab test results for the soil for each test pit.



**Figure 8: CBR at 95% and soil classification of Mwanza-Igoma-Buhongwa Road**





**Figure 9: Igoma-Buhongwa Road Test pits**

### **Chemical test results on Groundwater samples**

Chemical Tests were carried out on selected samples of groundwater including the water pH, sulphate (SO<sub>4</sub><sup>2-</sup>) content and chloride (Cl<sup>-</sup>) content. The tests were performed according ASTM D1293 Method B [pH of water by electrometric method], EPA Method 9038 [Determination of Sulphate content by turbidimetric method], D512 [Determination of Chloride Content by Silver Nitrate or Mohrs method] respectively.

- Mwanza - Mirono River: 3 tests were performed on the groundwater samples where adjusted pH is 8.61 to 8.98, CL<sup>-</sup> content is 213mg/L to 240.5mg/L, and sulphate content is 115.48mg/L to 124.22mg/L.

The analyses of Exposure/Environmental Conditions and Durability Requirements for Concrete are provided in item 1.7 and 1.8.3.

### **Specific Gravity**

- Mwanza - Mirono River: 19 tests were performed on the clay and sand samples on different depths. The min. specific gravity of the samples = 2.532 and the max. = 2.99 with an average specific gravity = 2.709.

### **Groundwater Table**

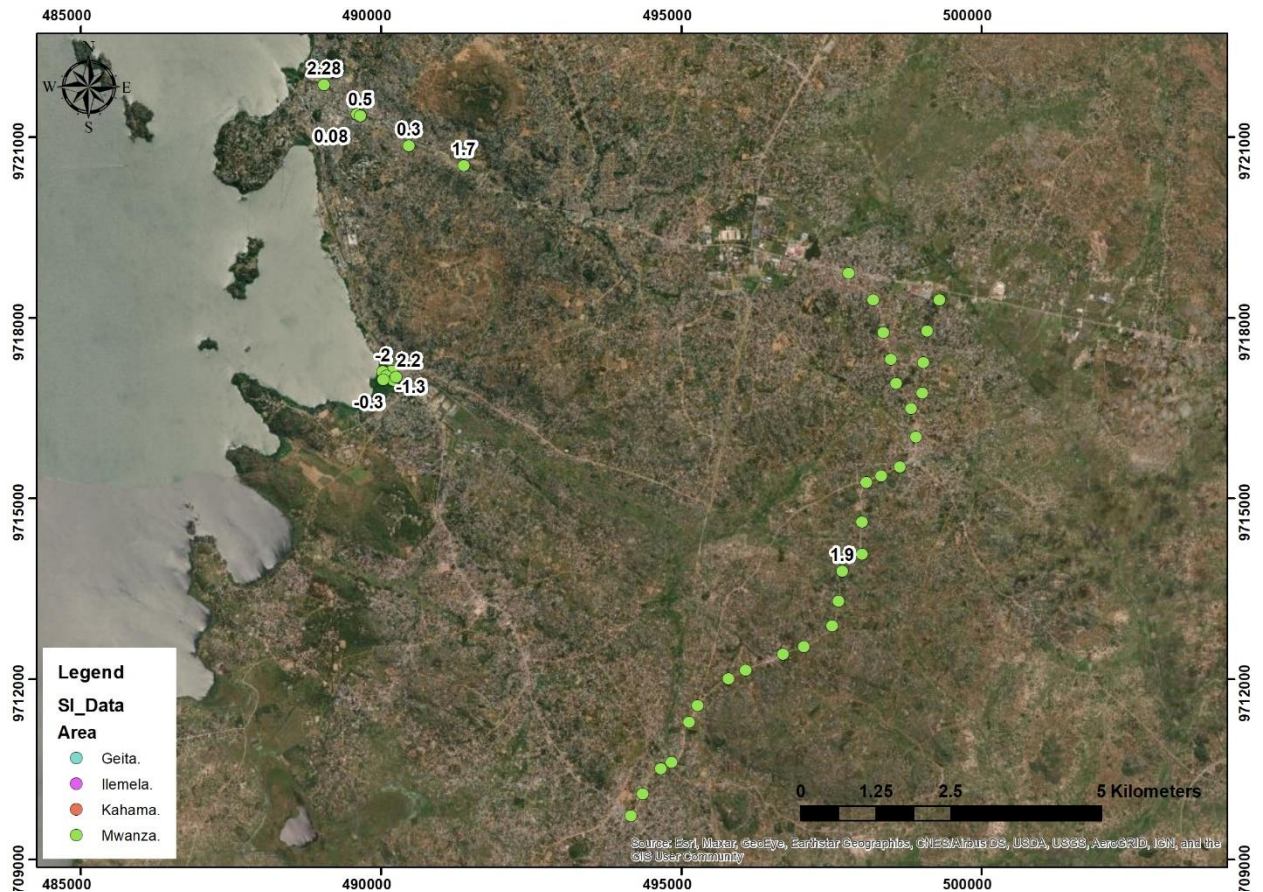
Groundwater depth at Mwanza Mirono River boreholes are in the range from 0.2m depth (N-CU-02a) to 6.0m depth at (N-CU-05). The permeability of the clay layer was found between  $7.2 \times 10^{-9}$  m/sec. to  $3.1 \times 10^{-7}$  m/sec.

No groundwater was observed in the test pits excavated for Mwanza-Igoma-Buhongwa Road.

#### 1.4.2 Hydrogeological conditions

This section presents the hydrogeologic conditions at the project site, including the available subsurface data, and measured groundwater levels from piezometers, boreholes, and test pits. Furthermore, the section provides the calculated Maximum Design Groundwater Level (MDGWL) for the project site.

As described earlier in sub-section no. 1.4.1 and based on the results of the recently carried out subsurface investigation, a gravelly SAND layer with a thickness of 10.0 m is found on the surface at the highest point, followed by a layer of stiff sandy CLAY with a maximum thickness of 12.0m. The groundwater table is encountered near the surface as shown in Figure 10 while Table 15 shows the summary of the measured depth to water and permeability values within the area of Mwanza.



**Figure 10: Site investigation data carried out in Mwanza with the encountered depth to groundwater (negative values indicate the water is above natural ground level).**

**Table 15: Summary of the measured depth to groundwater and permeability in Mwanza**

		Characteristic	Value
<b>Depth to groundwater (m)</b>		Average	0.22
		Min	-2.00
		Max	2.28
<b>Permeability (m/day)</b>		Average	0.05
		Min	0.0006
		Max	0.23

#### 1.4.3 In-Situ and Laboratory Tests

The laboratory tests were performed on samples retrieved from site according to the relevant local standards, ASTM, and British standards. The in-situ as well as laboratory tests were performed in order to determine the characteristics of the encountered subsurface strata.

The laboratory tests included the following tests:

- Classification tests such as grain size analysis, selected sedimentation tests, specific gravity, Atterberg limits (BS 1377 Part 2),

- Selected chemical testing on groundwater samples pH and Chloride (ASTM D 512 MOHR'S METHOD), and for sulphate content (ASTM D 516 -07 / BS 1377 Part 3:1990) to assess their possible aggressiveness on concrete and reinforcement.
- Selected chemical testing on soil samples for pH and Chloride (ASTM D 512 MOHR'S METHOD), and for sulphate content (ASTM D 516 -07 / BS 1377 Part 3:1990) to assess their possible aggressiveness on concrete and reinforcement.
- CBR tests and swell after 4-days soaking for each typical soil type identified (BS 1377 PART 4: 1990)
- Direct shear tests on soil samples (BS 1377: Part 7: 1990)
- Bulk density and moisture content (CML 1.6 ref BS 1377 Part 2)
- Uniaxial compression tests when RQD allows selecting sample and Point Load tests on the rock samples.
- Falling head tests (BS EN ISO 22282-2) and constant head.

### 1.5 Basis for the Design

This section presents the design basis for the foundations of various proposed structures, retaining walls, pavements, site class, subsurface concrete.

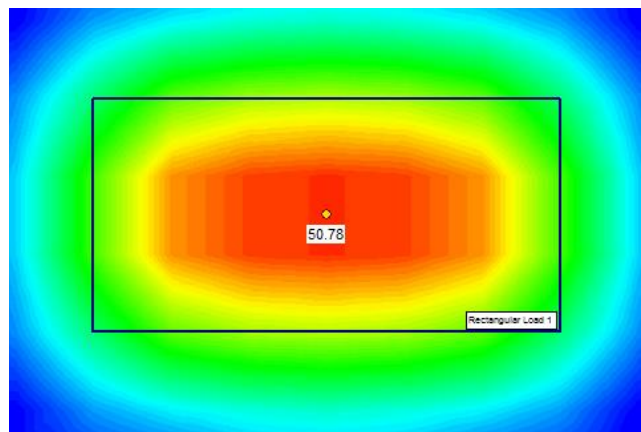
#### 1.5.1 Mirongo River Culverts

The upper layer in the location of the culverts is mainly consists of loose sand with rubbish, which is not suitable as a foundation soil. Accordingly, a soil replacement layer consists of engineered fill of thickness 1.0m /1.5m (and protrusion 1.0m/1.5m out of foundation edges) is to be adopted below the foundation level to decrease the anticipated settlement, to ensure a regular distribution of the stresses along the foundation, decrease the expected differential settlement along the foundations by removing the loose layer up to 3.0m depth.

For the analysis of the culverts, a raft dimension of 12m length and 6.0m width is assumed for calculations using SETTLE 3.

For Culverts in N-CU-01, N-CU-02a, and N-CU-02b, the settlement shall be analyzed considering two worst cases:

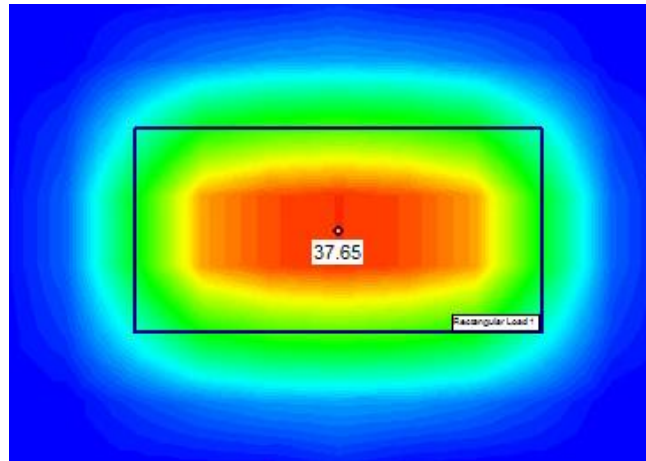
- **For N-CU-01:** the replacement layer ( $E = 50\text{MPa}$ ) shall be rested on a 1.5m medium dense silty Sand ( $N = 18$ ,  $E = 0.7*N = 12.6\text{MPa}$ ), followed by 3.0m hard clay layer ( $C_c = 0.149$ ,  $C_r = 0.024$ ), then dense Sand ( $N = 34$ ,  $E = 0.7*N = 24\text{MPa}$ )



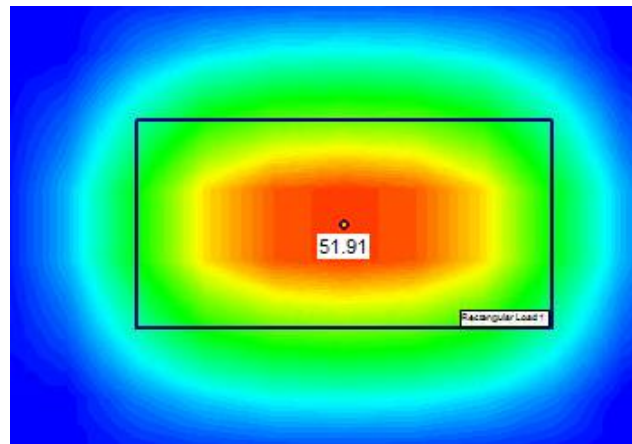
The results concluded as per program SETTLE 3, shown above, results in a settlement =50mm.

- **For N-CU-01b:** the replacement layer ( $E = 50\text{MPa}$ ) shall be rested on a 2.0m very stiff clay layer ( $C_c = 0.139$ ,  $C_r = 0.017$ ), then very dense Sand ( $N = 44$ ,  $E = 0.7 \cdot N = 31\text{MPa}$ )

The results concluded as per program SETTLE 3, shown above, results in a settlement =37mm.



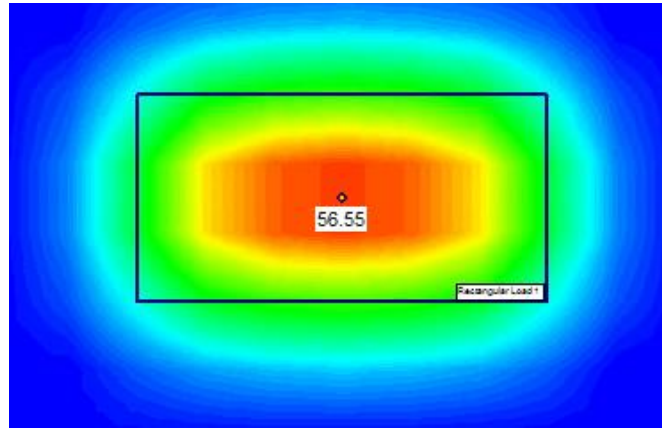
- **For Culvert in N-CU-04,** the replacement layer ( $E = 50\text{MPa}$ ) shall extend to be 1.5m to replace the very loose Sand layer ( $N=2$  under GW, supposed to be liquefiable). Then the replacement layer shall be rested on 1.0m stiff Clay ( $N=11$ ,  $E' = 6.6\text{MPa}$ ), and 1.5m medium dense clayey Sand ( $N = 16$ ,  $E = 0.7 \cdot N = 11.2\text{MPa}$ ) followed by 2.3m very stiff Clay ( $N = 20$ ,  $E' = 0.6N = 12\text{MPa}$ ,  $C_c = 0.211$  and  $C_r = 0.056$ ) and very dense Sand ( $N_{\text{avg.}} = 30$ ,  $E = 21\text{MPa}$ ).



The results concluded as per program SETTLE 3, shown above, results in a settlement =51mm.

- **For Culvert in N-CU-05,** the replacement layer ( $E = 50\text{MPa}$ ) shall extend to be 1.5m to replace the very loose Sand layer and shall be rested on 2.3m firm Clay ( $E_{\text{oed}} = 6.25\text{MPa}$ ), and 1.0m loose to medium dense clayey Sand ( $N = 10$ ,  $E = 0.7 \cdot N = 7.0\text{MPa}$ ), followed by 0.8m of firm clay ( $C_c = 0.189$  and  $C_r = 0.05$ ), then medium to very dense Sand ( $N_{\text{avg.}} = 30$ ,  $E = 21\text{MPa}$ ).





The results concluded as per program SETTLE 3, shown above, results in a settlement =56mm.

### 1.6 Exposure/Environmental Conditions and Durability Requirements for Concrete

This section discusses the exposure conditions and the durability requirements in addition to the relevant measures that shall be taken into consideration for the protection buried structural concrete elements.

The exposure conditions and necessary protection measures of reinforced substructure concrete elements shall be assessed according to BS EN 206 standard and its complementary BS 8500-1 Standard. The concrete protection measures will be adopted to ensure dense and durable concrete over the project design life of 50 years for the building structures and 100 years for the infrastructure/culvert concrete.

#### Mwanza City

The chemical composition test results of groundwater samples obtained from test pits and boreholes drilled at the project location reveal moderate levels of chlorides with low levels of sulphates in the tested groundwater samples, as summarized in the below table. Chemical composition test results on soil samples are not available to validate the exposure.

	Water Samples		
	Chloride (as Cl), (mg/l)	Sulphate (as SO4), (mg/l)	pH
<b>Min.</b>	103.1	21.3	6.21
<b>Max.</b>	240.5	142.4	7.93
<b>Average</b>	163.98	99.22	7.18
<b>Adopted in Analysis*</b>	240.5	142.4	7.93
<b>Count</b>	11	11	11

\* The maximum concentrations were considered for the groundwater samples.

The foundations and other substructure concrete elements are anticipated to be in contact with shallow groundwater. In absence of test data on the soil samples, the exposure conditions classified for the Mwanza city is considered to be validated at later stages once the missing data is made available for review.

#### ○ Preliminary Geotechnical Recommendations

Based on the mentioned in the above section, the following recommendations shall be followed.

### 1.6.1 Foundation Recommendations for the Culverts

- A confirmatory geotechnical site investigation program at the Mwanza, Mirongo River culverts foundations should be carried out by the Contractor before start of the construction work considering performing boreholes of sufficient depth lower than the culverts foundations. The site investigation factual report is to be send to the Engineer to verify the geotechnical design assumptions.
- Allowable bearing capacity of the soil under the culvert is 100 kPa.
- Excavation should proceed below foundation level down 1.5m for the culverts between Kilometer 0+000 to 3+000 and down 1.0m for the culverts from kilometer 3+000 to 4+900. Any loose layer's fill materials, soft spots and any inferior materials such as broken or loose rocks at the excavation level should be totally removed and replaced by an approved material as directed by the Engineer.
- The excavation level should be flooded with water, where applicable, for not less than 48 hours and then left to dry. The excavation level should be well compacted using a vibratory roller with a static load that is not less than 15.0 tones to its maximum dry density under the supervision of a qualified geotechnical engineer.
- An approved replacement backfill material (Engineered fill) of 1.5m thickness for the culverts between kilometer 0+000 to 3+000 and of 1.0m thickness for the culverts from kilometer 3+000 to 4+900 should be then placed in compacted layers as per earthmoving Specifications from the excavation level to reach the foundation level with a protrusion of the same thickness all around.
- In case of open excavation, the Contractor is to guarantee a safe excavation slope not steeper than 2.0 Horizontal: 1.0 Vertical. Otherwise, an excavation supports and protection systems/shoring capable of safely resisting soil and groundwater pressures, shall be designed, provided, installed, monitored and maintained for supporting the sides of the excavation without disturbing the underlying soil or causing any damage to adjacent structures, utilities, pavements, or other facilities, in a manner accepted to the Engineer, at the Contractor's sole risk and responsibility. The Contractor is also responsible for removing the excavation supports and protection systems when they are no longer needed without disturbing the underlying soil or causing any damage to adjacent structures, utilities, pavements, or other facilities.
- Unless shoring/side support is used, the Contractor is to follow the default construction sequence. This includes the excavation and erection of deeper footings adjacent to any shallower ones. Excavation close to existing foundations/raft is prohibited unless special precautions are taken after consulting the Engineer.
- If the ground water is encountered during foundation excavation, or need arises to excavate below the groundwater level, a dewatering system is to be maintained to lower the water level below the proposed excavation/foundation levels by a minimum of 0.50 m to enable inspection, cleaning and pouring of concrete in the dry. The dewatering system is to be designed to ensure that there is no migration of fines during dewatering.
- The backfill behind and above the walls of the culverts is to follow the "soil filling and backfilling for roads" Specifications
- The soil/GW is to be considered aggressive requiring protection against chemical attacks.

### 1.6.2 Earthwork and Excavation Support

Open cuts may be applied whenever the soil and site conditions allow for unsupported cut slopes. Otherwise, an adequate temporary shoring system will be used such as sheet pile

walls, secant piles walls, and/or others. The temporary shoring system shall be designed, provided, installed, operated, maintained and dismantled (upon completion of works) by the Contractor wherever required. The Supervising Engineer shall ensure the review of the Contractor's relevant design notes, method statement, and Quality Control system.

Based on the stability and nature of the soil, it is recommended to use earth slopes not steeper than 2.0H: 1.0V at the excavation levels.

The backfill to be used behind retaining walls shall consists of well graded granular soil such as A-1-a as per AASHTO classification and should be placed in layers not exceeding 25cm in thickness and compacted to the required 95% compaction of the maximum dry density according to ASTM D-1557 specification.

In general, it is recommended to use filling material classified as (A-1-a) and/or (A-1-b) according to AASHTO for structural filling works, while (A-2-4) can be used for general fill works, (A-3) can be used only in confined areas.

All fill material shall be compacted as per project specifications and approved by the Engineer, so as to produce a minimum degree of compaction of 95 percent. Clean sands and gravel fill shall be defined as cohesionless granular material meeting the following requirements: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; with at least 90 percent passing a 37.5-mm sieve, maximum Plasticity index 6%, maximum percentage by Dry Weight passing #200 sieve is 12%.

### 1.6.3 Reuse of Excavated Materials

The table below summarizes for each borehole the thickness of material that is not suitable for use as engineered fill, such as soil with high silt/clay content.

Borehole No.	Drilled Depth (m)	Plastic Material	Thickness (m)	Remarks
M-BH-01 to M-BH-06	10/15	Sandy Clay/Silt of intermediate to high plasticity + v. loose Sand	10/15	% of fines in sieve analysis is more than 20% Very loose Sand is liquefiable and not suitable for reuse
N-CU-01 to N-CU-05	10	Sandy Clay of intermediate plasticity + loose Sand	10	% of fines in sieve analysis is more than 20% loose Sand is liquefiable and not suitable for reuse
N-CU-01	10	Medium dense gravelly Sand (0.0 to 0.8m) & (2.0-4.0m)	2.8	
N-CU-02a	10	Medium to v. dense gravelly Sand (0.0 to 2.0m) & (3.5 to 4.5m) &(6.0 to 8.0m)	5.0	

Generally, it is noticed from the table above that the majority of soil in the logs indicate soil of inappropriate quality for engineered fill. The sandy Silt or Clay is not suitable for fill due to its high percentage of fines as a compressible material. Very loose to loose Sand has high percentage of fine sands which is liquefiable material when subjected to the high groundwater levels in the site and works as unstable material. Other suitable soils as in the table in some defined depths in boreholes N-CU-01, N-CU-02a, and N-CU-02b have smaller fines content and are suitable for fill material.

## 2 PAVEMENT

### 2.1 Introduction

The pavement design criteria are in accordance with the following reference standards:

- Tanzania Pavement and materials Design Manual 1999
- Tanzania Low Volume Roads Manual, 2016
- AASHTO Guide for Design of Pavement Structures

### 2.2 Summary of Traffic Study Results

The ESAL was calculated taking into consideration the road hierarchy and traffic volumes. The traffic volumes relevant to the different roads of the facility expressed in terms of 18-Kips Equivalent Standard Axle Loads (ESAL) is estimated as follows:

City	Road Name	Traffic volume (Million ESAL)
Mwanza	Igoma-Buhongwa road	0.1

### 2.3 Pavement Design

Based on the Tanzania Pavement and materials Design Manual 1999 (Chapter 8) and the Tanzania Low Volume Roads Manual, 2016 (Part D- Chapter 13), the following designed sections were proposed for the assigned roads

#### 2.3.1 Mwanza City

According to Tanzania, Pavement and Materials Design Manual issued in 1999, Chapter, Environment. Mwanza city is set to be located at Moderate Region

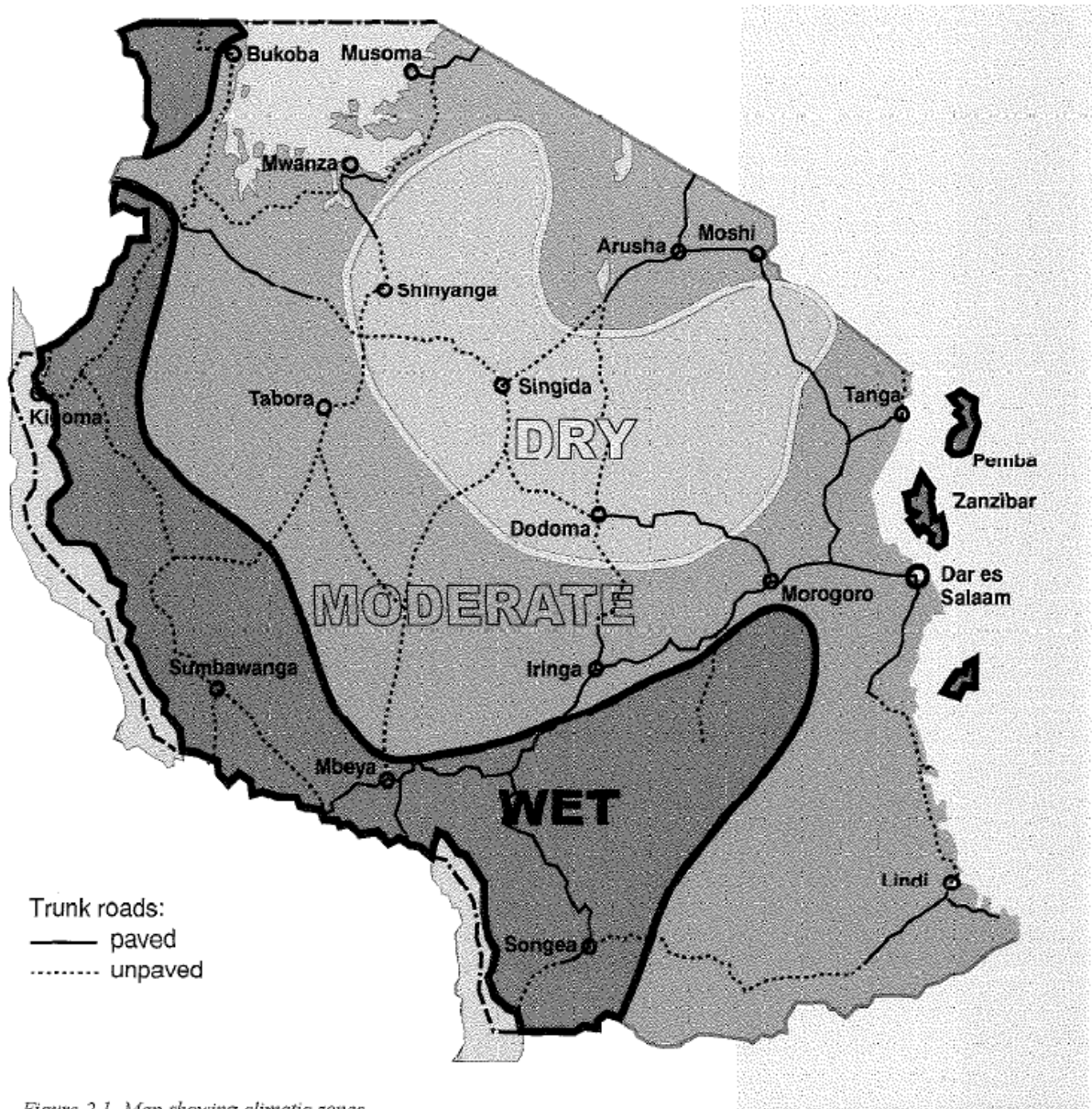


Figure 2.1 Map showing climatic zones

For the Igoma – Buhongwa Road, the assigned traffic volume was 0.1 million ESAL. According to the Tanzania Low Volume Roads manual of design chart 13.6 presented below, the following thicknesses shall be adopted for the Aggregate base course and subbase course layers (assuming S4 Subgrade category):

- 150 mm Thickness of Natural Aggregate Base G55
- 100 mm Thickness of Natural Aggregate Subbase course G30

Table 2.1 Unbound layers thicknesses as per LVRT 2016

Table 13-6: Bituminous pavement design Chart 2 (moderate and dry areas)

Subgrade CBR	TLC 0.01	TLC 0.1	TLC 0.3	TLC 0.5	TLC 1.0
	< 0.01	0.01-0.1	0.1-0.3	0.3-0.5	0.5-1.0
S1 (<3%)	Special subgrade treatment required				
S2 (3-4%)	150 G45 150 G15	150 G65 125 G30 150 G15	150 G80 150 G30 175 G15	175 G80 150 G30 175 G15	200 G80 175 G30 175 G15
S3 (5-7%)	125 G45 125 G15	150 G55 175 G30	175 G65 175 G30	175 G80 200 G30	175 G80 250 G30
S4 (8-14%)	200 G45	150 G55 100 G30	150 G55 150 G30	175 G65 150 G30	175 G80 175 G30
S5 (15-29%)	150 G45	200 G55	125 G55 125 G30	125 G65 125 G30	150 G80 125 G30
S6 (>30%)	150 G45	175 G45	175 G55	175 G65	175 G80

As per Chart 13-9 of the same manual of design, The SN assigned for the Bituminous Wearing course for the category of subgrade S4 is set to be “1.05”.

Table 2.2 Structural numbers for asphalt layer for wet areas as per LVRT 2016

Table 13-9: Structural Numbers (SN) for Bituminous Pavement Design Chart 2  
(Table 13-5: Moderate & Dry areas)

Subgrade Class (CBR)	TLC 0.01	TLC 0.1	TLC 0.3	TLC 0.5	TLC 1.0
	< 0.01	0.01 – 0.1	0.1 – 0.3	0.3 – 0.5	0.5 – 1.0
S1 (<3%)	Special subgrade treatment required				
S2 (3-4%)	1.05	1.55	1.80	2.0	2.15
S3 (5-7%)	0.9	1.35	1.55	1.70	1.95
S4 (8-14%)	0.7	1.05	1.35	1.45	1.6
S5 (15-29%)	0.6	0.85	1.05	1.1	1.3

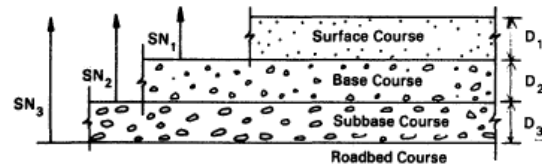
Note: These values exclude a contribution from the surfacing.

Following the figure 3.2 of the AASHTO guide for Design of Pavement Structures 1993, the asphalt thickness needed for the bituminous course is equal to  $SN1/a1 = 1.05/0.44 = 2.38$  inches = 60.6 mm thickness.

Table 8.4 Pavements with granular base course – dry or moderate climatic zones

<p>Traffic:</p> <ul style="list-style-type: none"> <li>- Traffic Load Classes, including the heavy (-H) classes: /Chapter 4/</li> </ul> <p>Subgrade design:</p> <ul style="list-style-type: none"> <li>- Design for CBR less than 15%: /Chapter 5/</li> <li>- Material standards of improved subgrade layers: /Chapter 5/</li> </ul> <p>Surfacing design:</p> <ul style="list-style-type: none"> <li>- Surface treatments, carriageway: /Chapter 10.2 to 10.4/</li> <li>- Shoulders: /Chapter 10.7/</li> <li>- Asphalt concrete: /Chapter 10.8/</li> </ul> <p>Material requirements:</p> <ul style="list-style-type: none"> <li>- Granular or cemented materials for subbase layers or base course: /Chapter 7/</li> <li>- Bituminous surfacings: /Chapter 10/</li> </ul>		<p>Base course type:</p> <h1 style="text-align: center;">Granular</h1>						
		<p>Climatic zones: <b>Dry / Moderate</b></p> <p>/Figure 2.1/</p>						
<p>Heavy Traffic Load Classes (-H) apply for E80 &gt;0.2 million under conditions where more than 50% of E80 comes from axles loaded to above 13 tonnes.</p>		<p>Traffic Load Classes (million E80)</p>						
		< 0.2	0.2 - 0.5	0.5 - 1.0	1 - 3	3 - 10	10 - 20	20 - 50
		TLC 02	TLC 05	TLC 1	TLC 3	TLC 10	TLC 20	TLC 50
Surfacing	For the heavy Traffic Load Classes (TLC 05-H to TLC 20-H)	(not applicable)	as below	as below	as below	AC 50mm	AC 100mm	
	General requirements	ST	ST	ST	ST	ST	AC 50mm	
Base course	For the heavy Traffic Load Classes (TLC 05-H to TLC 20-H)	(not applicable)	125mm CRS	150mm CRS	150mm CRR	as below	as below	
	General requirements	150mm G60	150mm G80	150mm G80 <sup>2)</sup>	150mm CRS	150mm CRR	150mm CRR	
Subbase <sup>1)</sup>	For the heavy Traffic Load Classes (TLC 05-H to TLC 20-H)	(not applicable)	as below	as below	200mm CM	as below	as below	
	General requirements	150mm G25	150mm G45	200mm G45	200mm G45	200mm C1	150mm + 150mm C2 C1	
<b>Subgrade</b>		<b>CBR ≥ 15%</b>						

1) If other types of subbase materials are preferred, the substitute shall meet the requirements set out in Chapter 8.3.1  
 2) G80 can be used up to 2 million E80 in dry climatic zone./Figure 2.1/



$$D^*_1 \geq \frac{SN_1}{a_1}$$

$$SN^*_1 = a_1 D^*_1 \geq SN_1$$

$$D^*_2 \geq \frac{SN_2 - SN^*_1}{a_2 m_2}$$

$$SN^*_1 + SN^*_2 \geq SN_2$$

$$D^*_3 \geq \frac{SN_3 - (SN^*_1 + SN^*_2)}{a_3 m_3}$$

- 1)  $a$ ,  $D$ ,  $m$  and  $SN$  are as defined in the text and are minimum required values
- 2) An asterisk with  $D$  or  $SN$  indicates that it represents the value actually used, which must be equal to or greater than the required value

Figure 3.2. Procedure for Determining Thicknesses of Layers Using a Layered Analysis Approach

However as per Tanzania Pavement and Materials Design Manual 1999, chapter 8- Pavement Design New Roads, the pavement section will be as follows:

- Bituminous Surface treatment
- 150 mm Aggregate Base course G80
- 150 mm Aggregate Subbase Course G25

As per the available borrow pits in the area, there are no natural G80 or G45 which are recommended in the Design Manual code. Therefore, as compromise between the design manuals and to adhere to the project quality finishes requirements, the following section is proposed:

- 50 mm Bituminous Wearing Course, AC20
- Prime Coat, MC-30 (1.0 to 1.5 Liters/ Square Meter)
- 150 mm Granular Crushed Base Course CRR,
- 150 mm Cement Stabilized Base C1
- 150 mm Upper Subgrade Layer, G15
- 150 mm Lower Subgrade Layer, G7
- Variable thickness Fill, min. G3

### Soil improvement recommendations

From the available excavated test pits, the soil under the subbase and base of the roads in Mwanza is to be improved (partially in some locations) based on Tanzanian Pavement and



Material Design Manual-1999, item 5.5.2, Figure 5.4 (considering the material requirements for improved subgrade layers as in table 5.5) as follows:

Igoma-Buhongwa road 1:

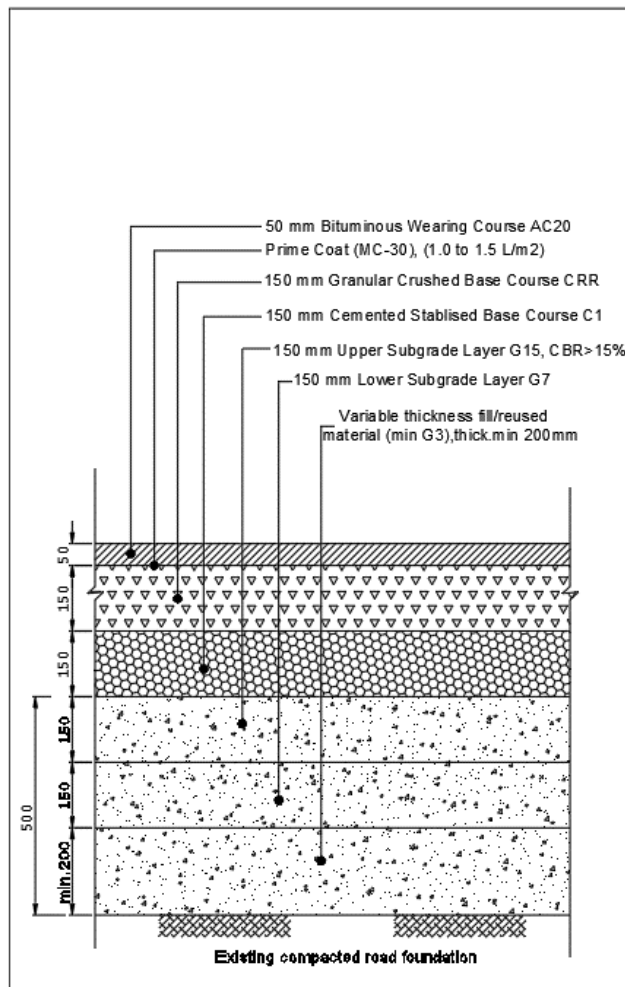
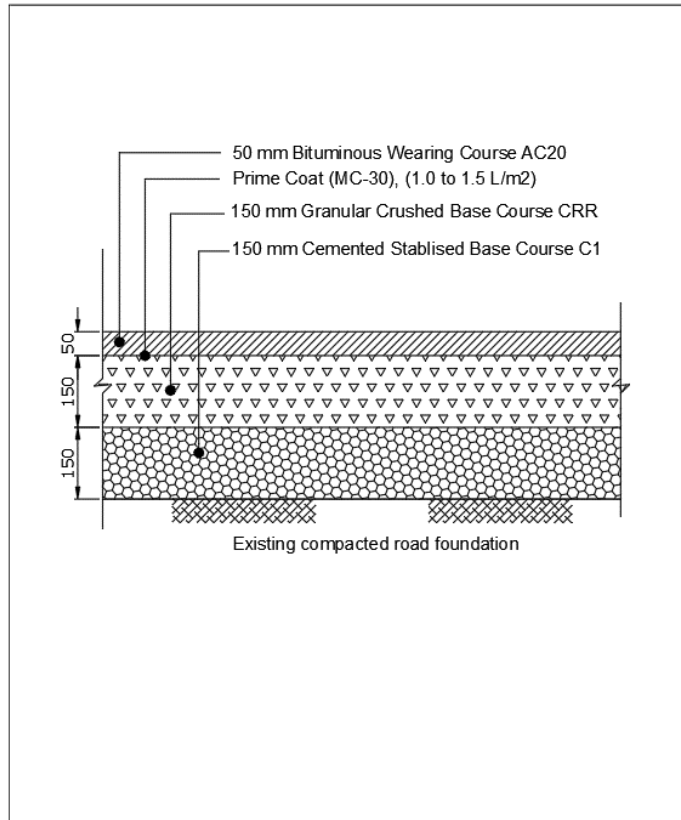
- 0.5m improved subgrade layer consists of 150mm upper layer of G15 followed by 150mm lower layer of G7, then G3 fill (as directed by the Engineer for site adjustment): (St. 2+150 to 2+550) & (St. 3+800 to 4+100) & (St. 5+600 to 6+200) is required under the subbase of the road, with a protrusion of 0.5m outside the road. The slope of the soil replacement is to be 3.0 H: 1 V.
- 1.0m improved subgrade layer consists of 150mm upper layer of G15 followed by 150mm lower layer of G7, then G3 fill (as directed by the Engineer for site adjustment): (St. 0+000 to 2+150) & (St. 2+550 to 3+800) & (St. 4+100 to 4+600) & (St. 8+000 to 8+500) & (9+100 to 11+300 (End)) is required under the subbase of the road, with a protrusion of 1.0m outside the road. The slope of the soil replacement is to be 3.0 H: 1 V.
- Scrapped of the upper layer and well compaction of the bed layer (St. 4+600 to 5+600) & (St. 6+200 to 8+000) & (8+500 to 9+100), no replacement is needed.

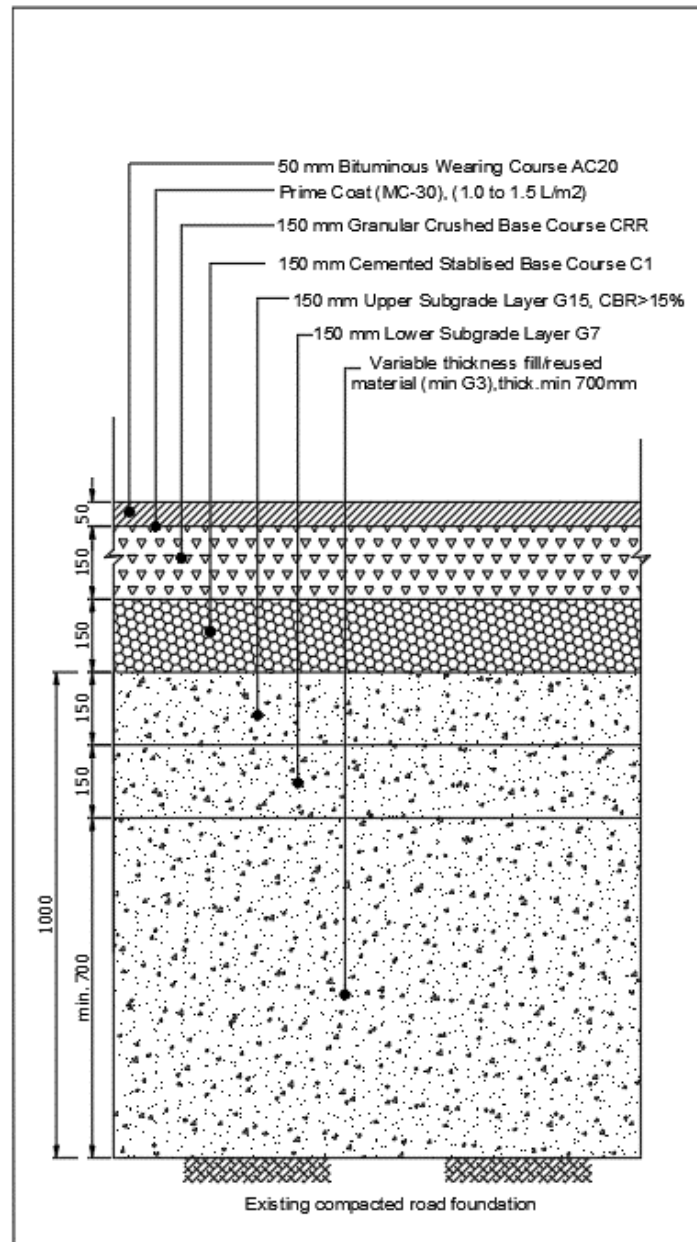
Igoma-Buhongwa road 2:

- 1.0m improved subgrade layer consists of 150mm upper layer of G15 followed by 150mm lower layer of G7, then G3 fill (as directed by the Engineer for site adjustment): (St. 0+000 to 1+100) & (St. 2+200 to 2+600) is required under the subbase of the road, with a protrusion of 1.0m outside the road. The slope of the soil replacement is to be 3.0 H: 1 V.
- 0.5m improved subgrade layer consists of 150mm upper layer of G15 followed by 150mm lower layer of G7, then G3 fill (as directed by the Engineer for site adjustment): (St. 2+600 to 3+070 (End)) is required under the subbase of the road, with a protrusion of 0.5m outside the road. The slope of the soil replacement is to be 3.0 H: 1 V.
- Scrapped of the upper layer and well compaction of the bed layer (St. 1+100 to 2+200), no replacement is needed.

Moreover, the following recommendations are to be considered before and during the construction of Mwanza roads:

- The excavation for the improved subgrade shall proceed by the required depth, or till reaching the rock layer, whichever is shallower
- The existing ground surface shall be scraped to at least 0.5m to remove any waste materials or plant roots and well compacted.
- The Contractor shall follow the material requirements of improved subgrade layers and fills as cited in Pavement and Materials Design manual, 1999, Chapter 5, and as specified in the standard specifications for Roadworks, Section Earthworks.
- Based on the improvement measures required, three sections were introduced along the sector of road as follows:





## 2.4 Material Source

Existing and Virgin Sources of gravel, rock/aggregate, sand and water were sampled and tested in the study area as detailed in this section (refer to Appendices of factual data).

The performed tests for the potential Gravel sources are:

- Grading (particle size distribution),
- Atterberg Limits,
- Moisture/density relationship,
- California Bearing Ratio (CBR)
- Any other necessary tests as per PMDM.

The performed tests for the potential sources of hard stone are:

- Los Angeles Abrasion,
- Aggregate Crushing Value (ACV) and or Ten Per Cent Fine Value (TFV),
- Sodium Sulphate Soundness,

- Bitumen Affinity,
- Specific Gravity and Water Absorption,
- Soluble salts content,
- Aggregate Impact Value (AIV),
- Any other necessary tests as per PMDM.

Moreover, the existing water sources for supplying water for construction works were identified and its quantity and quality (pH, Chloride content, and Sulphate content) were assessed. The tests on Sand sources included the gradation, fines content and the organic content.

#### 2.4.1 Locations of Sources of Material

The material sources and estimated quantities for Mwanza and Ilemela areas are as below:

##### **Gravel Sources**

- Mwanza-Ilemela – Ilalila: The estimated quantity is 35000 not active.

The test results on some samples show that the gravel is clayey Gravel with sand (62% Gravbel, 9% Sand, 29% fines and PMDM class is G15.

##### **Sand Sources**

- Mwanza-Ilemela Sand – Kiesa: The estimated quantity is 11000 active, pit sand.
- Mwanza-Ilemela Sand – Bujingwafela: The estimated quantity is 5500 not active, river sand.

The test results on some samples show that the sand sources had a high fines content and had too many organic impurities. They are not suitable for use in concrete work. Other sources need to be explored.

##### **Rock sources**

- Mwanza-Ilemela Quarry – Bukandwe: The estimated quantity is 285000 active quarries.

Existing Granite quarries were found at Bukandwe in Mwanza. The results of SSS on the aggregate from Bukandwe Quarry MWANZA are non-compliant for asphalt. Confirmatory testing may be carried out to verify otherwise an alternative source is to be sought.

##### **Water source**

- Mwanza-Ilemela - Lake Victoria.

The test results on some samples show that: pH value is 7.58, Chloride content 130.6 mg/l, and Sulphate content 27.8 mg/l. The source is suitable for construction works. Care should be taken not to contaminate or deplete adjacent public water sources.

Area	Easting	Northing	Estimated Quantity	
<b>GRAVEL SOURCES</b>				
1	MWANZA ILEMELA Gravel - Ilalila	503,311.20	9,734,309.50	35000 - not Active
<b>SAND SOURCES</b>				
1	MWANZA ILEMELA Sand - Kisesa	510,635.00	9,720,040.90	11000 - Active Pit Sand
	MWANZA ILEMELA Sand - Bujingwafela	505,649.60	9,710,604.70	5500 – not Active River Sand
<b>QUARRY / Rock Sources</b>				
1	MWANZA ILEMELA Quarry - Bukandwe	516,050.20	9,716,745.10	285000 Active quarry
<b>WATER SOURCES</b>				
1	MWANZA ILEMELA – Lake Victoria	489,777.00	9,717,659.10	Lake

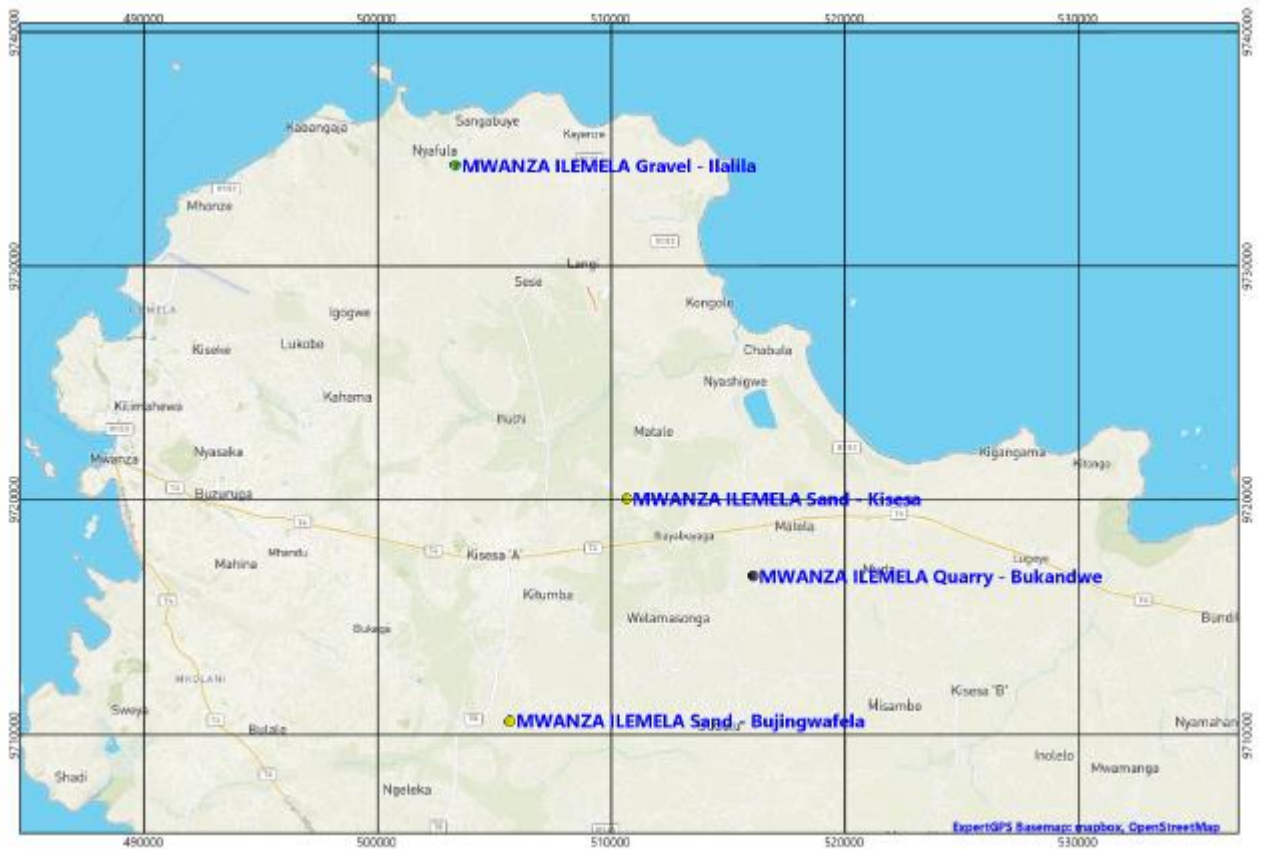


Figure 12: Sources of materials for Mwanza and Ilemela

**Appendix VIII: Grievance Receipt and Resolution Form for Project Affected Persons (PAPs)**

**Grievance/Complaint Registration Number: ..... Date: .....**

**A. COMPLAINANT**

**1. Important information of the Complainant**

First Name ..... Middle Name ..... Last Name: .....

Occupation:..... Title.....

Address:.....

Mob. Phone..... E-mail: .....

**2. Who is complaining**

i. Project Affected Persons (PAPs).....

**Specific PAPs are:**

o City staff.....

o Labourer .....

o Representative of complainant.

o Others .....

ii. Technicians/Local Fundis .....

**B. EXPLANATION OF THE GRIEVANCES**

1. Source of Grievance/ Complaint.....

2. Brief explanation of the Grievance/Complaint emanating from the project implementation.....

3. Event/person being complained about .....

4. Place where the event occurred .....

5. Date of the event .....

6. Have you ever filed the same grievance before? .....Yes.....  .....No.....

**C: LODGING THE GRIEVANCE/COMPLAINT**

1. Method used to lodge the grievance/complaint

Letter  Phone  Face to face  E-mail  Others  
(Mention).....

2. Name of Person registered and Filed the complaint

Name..... Position..... Date.....

3. Agreed time frame for feedback on the processed grievance/complaint:

(a) Immediately  (b) Three days  (c) One week  (d) Two weeks .....

**GRIEVANCE/COMPLAINTS RESOLUTION**

1. Date of conciliation session.....  .....

2. Was the complainant present? **Yes**  **No**

3. Was field verification of complaint conducted? **Yes**  **No**

4. Findings of field investigation...  
.....  
.....  
.....

5. Summary of Conciliation Session.....  
.....  
.....

6. Was agreement reached on the issues? **Yes**  **No**

7. If agreement was reached, give the details of the agreement  
.....  
.....

8. If agreement was not reached, specify the points of disagreement and promise given to the client  
.....  
.....

**Signed (Arbitrator/ Complaints handling Officer-GHO): .....Date.....**

**Signed (Complainant).....Date.....**

**Signed (Independent Observer) .....Date.....**

**ENGLISH-SWAHILI VERSION OF NON-TECHNICAL EXECUTIVE  
SUMMARY FOR ENVIRONMENTAL AND SOCIAL IMPACT  
ASSESSMENT FOR THE PROPOSED IMPROVEMENT OF IGOMA  
– KISHIRI – BUHONGWA ROAD (14 KM) IN IGOMA, KISHIRI,  
LWAHNIMA AND BUHONGWA WARDS AND REHABILITATION  
OF MIRONGO RIVER (5.9 KM) IN NYAMAGANA, MIRONGO,  
PAMBA, MBUGANI, MABATINI, MAHINA AND MHANDU  
WARDS IN MWANZA CITY, MWANZA REGION**

**PROPONENT:**

MWANZA CITY COUNCIL (MCC)

P.O. BOX 1333

MWANZA

Tel: +255 28 250 1375/ +255 768 520 195

Email: [cd@mwanzacc.go.tz](mailto:cd@mwanzacc.go.tz) Web. [www.mwanzacc.go.tz](http://www.mwanzacc.go.tz)

**SUBMITTED TO:**

The National Environment Management Council (NEMC)

Regent Estate, Plot No. 29/30

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Tel: +255 22 2774889 or +255 22 2774852

Fax: +255 22 2774901

E-mail: [dg@nemc.or.tz](mailto:dg@nemc.or.tz)

**CONSULTANT:**

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Email: [rosemary.nyirenda35@gmail.com](mailto:rosemary.nyirenda35@gmail.com)

**SUBMISSION DATE: 15<sup>TH</sup> MAY, 2023**



## NON-TECHNICAL EXECUTIVE SUMMARY

### 1. Title and location of the project/undertaking

Environmental and Social Impact Assessment for the Proposed Improvement of Igoma – Kishiri – Buhongwa Road (14 Km) in Igoma, Kishiri, Lwahnima and Buhongwa Wards and Rehabilitation of Mirongo River (5.9 Km) in Nyamagana, Mirongo, Pamba, Mbugani, Mabatini, Mahina and Mhandu Wards in Mwanza City, Mwanza Region.

### 2. Name of the proponent and contacts

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P. O. Box 1333,

Mwanza, Tanzania.

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Email: [cd@mwanzacc.go.tz](mailto:cd@mwanzacc.go.tz) Web. [www.mwanzacc.go.tz](http://www.mwanzacc.go.tz)

### 3. Names and address of the Expert who conducted the EIA

ROSEMARY C. NYIRENDA

Mobile: +255 713 030 865/ +255 753 880 424

Email: [rosemary.nyirenda35@gmail.com](mailto:rosemary.nyirenda35@gmail.com)

### 4. Brief outline and justification of the proposed project

#### (a) Brief description of the project environment

The government of the United Republic of Tanzania in collaboration with development partners intends to finance the improvement of Igoma – Kishiri – Buhongwa Road (14 km) and the rehabilitation of Mirongo River in Mwanza City as part of the Tanzania Cities Transforming Infrastructure and Competitiveness (TACTIC) project financed by the World Bank (WB). Despite Mwanza City being rapidly growing city with most of the areas well developed and occupied, there are some areas which are not easily accessible causing traffic on accessible roads. This is due to poor quality of roads that lack drains and have potholes whereby during rainy seasons, the areas flood and on dry seasons there is dust pollution. Upgrading the road will ease traffic congestion, facilitate solid waste transportation to Buhongwa, serve significant number of communities, reduce flooding as well as reduce dust pollution. The construction of Mirongo river storm water drain will reduce floods due to

climatically changes and increase of human activities, the river over flows and causes major impacts to communities and other structures.

The EIA study was conducted in accordance with the Environmental Management Act (Cap 191) and the Environmental Management Act (Environmental Impact Assessment and Audit) Regulations of 2005 as amended in 2018. The Regulations give mandate to NEMC to oversee the EIA process, which culminates with an award of the Environmental Impact Assessment Certificate by the Vice President's Office - Ministry responsible for the Environment. The Environmental Impact Assessment Certificate is among the prerequisite approvals required before the project takes off. This project will need this approval before it is implemented.

### **(b) Project Description**

The project will have two components, upgrading of the Igoma – Kishiri – Buhongwa Road and the construction of the main drain along Mirongo river. The proposed Igoma – Buhongwa road 14km project passes through Igoma ward, Kishiri ward, Lwahnima ward ending at Buhongwa ward. This road forms part of the ring road that is economically critical for Mwanza city by linking the Mwanza city centre to Shinyanga road and Mwanza to Musoma Road. The proposed road to be constructed are near sensitive areas which are mostly human settlements, businesses, farms as well as utilities such as TANESCO poles and water pipes which may be affected during project implementation. According to the master plan that was prepared for this road during feasibility study or design; Buhongwa to Kishiri right of way is 50 m from center line of the road, Kishiri to Igoma right of way is 20 m from center line of the road and Kishiri to Ukwoju right of way is 20 m from center line of the road. Mirongo river is located in Mwanza City, passing through seven wards of Nyamagana Mirongo, Pamba, Mbugani, Mabatini, Mahina and Mhandu. The river is approximated to have a length of 5.9 km. The proposed river dimensions are 20 m width with 10 m buffer from each side; however, this is not the existing case, the buffer varies from 5 to 10 m from each side due to some structures (there are some multi-story building). Mwanza city council wants to improve Mirongo river and reduce unwanted human activities in order to mitigate flooding in the downstream by removing siltation on the river. The city council also intend to beautify the areas along the river banks for recreational purposes and create income from the fees that will be collected.

The proposed project being a community service is projected to benefit a lot of people from different corners of Mwanza who will use the road to travel from one place to another for

several activities and also reduce flooding along the Mirongo River. Mwanza City Council, Ministry of Finance, PO-RALG, TARURA and transport sector and works department are the main actor in organizing and management of fund before and during construction phase. The proposed project will serve Mwanza City inhabitants and all transportation and conservation industry stakeholders for approximately more than 30 years after completion.

## **5. Policy, Legal and Institutional Framework**

Tanzania is committed to attaining Sustainable Development Goals. A few policies and legislation that have a close bearing to urban development are but not limited to National Environmental Policy (NEP) of 2021, National Transport Policy (2003), Construction Industry Policy (2003), National Land Policy (1995), National Gender Policy (2002), The National Investment Promotion Policy (1996) Environmental Management Act (Cap 191), Water Supply and Sanitation Act (2019), Land Act No. 4 of 1999, The Urban Planning Act (2007), Occupational Health and Safety Act (2003), The Road Act (2007), Employment and Labour Relations Act (2015), Engineers Registration Act (2007), the Contractors Registration Act (1997), The Local Government (Urban Authorities) Act (Cap 288), the Architects and Quantity Surveyors Act (1997), the HIV and AIDS (Prevention and Control) Act (2008), the Tanzania 2025 Development Vision and Environmental Impact Assessment and Audit Regulations (2005) as amended in 2018.

Others are the World Bank Environmental and Social Framework (ESF) which describes ten (10) Environmental and Social Standards (ESS). The ten ESSs as per the WB ESF are: ESS1: Assessment and Management of Environmental and Social Risks and Impacts; ESS2: Labor and Working Conditions; ESS3: Resource Efficiency and Pollution Prevention and Management; ESS4: Community Health and Safety; ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement; ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources; ESS7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities; ESS8: Cultural Heritage; ESS9: Financial Intermediaries; and ESS10: Stakeholder Engagement and Information Disclosure.

Given the nature of activities of this project, with the exception of ESS9: Financial Intermediaries almost all the ESSs are relevant. The World Bank's Environmental and Social Framework sets out the Bank's commitment to sustainable development, through a Bank Policy and a set of Environmental and Social standards that are designed to support Borrowers' projects, with the aim of ending extreme poverty and promoting shared

prosperity. The E&S Framework comprises of: (1) Vision for Sustainable Development, which sets out the Bank's aspirations regarding environmental and social sustainability; (2) The World Bank Environmental and Social Policy for Investment Project Financing, which sets out the mandatory requirements that apply to the Bank; and (3) The Environmental and Social Standards, together with their Annexes, which set out the mandatory requirements that apply to the Borrower and projects. Other document is the World Bank Environmental, Social, Health and Safety (ESHS) Guidelines.

## **6. Stakeholder Consultations and Public Involvement and the results**

Generally, most of stakeholder's views and concerns support the proposed project. All the comments received from the stakeholders were compiled, summarized and sorted to identify issues that have been addressed in the full and detailed Environmental Impact Assessment. A matrix with planned schedule of visits was prepared to guide the team to consult all stakeholders that were identified. Stakeholders were identified using simple methods such as focus group discussion and key informant interviews. In all the process of stakeholder consultation professional discussion was key especially when exploring technical issues. The stakeholders identified include but not limited to The President's Office – Regional Administration and Local Government (Project Coordination Unit), Mwanza City Council, Mwanza Urban Water Supply and Sanitation Authority (MWAUWASA), Tanzania Electric Supply Company Ltd (TANESCO), Tanzania Forest Services Agency (TFS), Tanzania Rural and Urban Roads Agency (TARURA), Land Transport Regulatory Authority (LATRA) Beach Management Unit (BMU), Association of People with Disabilities (PwDs), Ward and Mtaa Leaders as well as neighbours.

Major issues of concern raised were:

- Increased pressure on social services and utilities
- Employment opportunities
- Design of the roads and the river to consider the changing weather and the area's topography
- Dust and noise pollution
- Waste management problems during both construction and operation phase
- Labour issues during construction, locals to be given priority

### **1. Assessment of Impacts**

Impact identification in this EIA aimed at ensuring that all potential significant impacts were identified and addressed. The EIA team used tools to identify various impacts particularly adverse impacts. These impacts were identified during the stakeholders' consultative meetings, interview, literature review and observation. Some of the issues/impacts identified were thus regarded as possible impacts.

**(a) Mobilization and Construction phase**

- Positive Social Benefits
  - i. Benefits to communities resulting from employment during construction
  - ii. Benefits to businessmen due to improved transportation and increased accessibility
- Negative Social Impacts
  - i. HIV / AIDS among workers and nearby communities
  - ii. Safety and health risks due to influx of people working for the project
  - iii. Unwanted pregnancy
- Positive Environmental Benefits
  - i. Improved environment which consists of standard drainage system
  - ii. Improved air quality due to expected greenery
  - iii. Reduced flooding along Mirongo River
- Negative Environmental Impacts
  - i. Loss of natural vegetation
  - ii. Increased Dust and noise levels
  - iii. Waste management problems during construction
  - iv. Safety and health risks
  - v. Population influx from labourers
  - vi. Vibration pollution

**(b) Impacts associated with Operation Phase**

- Positive Social Benefits
  - i. Benefits to communities resulting from employment
  - ii. Increased accessibility of the areas
  - iii. Improved social services

- iv. Increased land value and development
- Negative Social Impacts
  - i. HIV / AIDS among workers and nearby communities
  - ii. Community safety caused by the influx of workers
  - iii. Unwanted pregnancy
- Positive Environmental Benefits
  - i. Improved environment which consists of standard drainage system
  - ii. Improved transportation of people and luggage
  - iii. Improved air quality due to expected greenery
- Negative Environmental Impacts
  - i. Increased pressure on social services and utilities
  - ii. Increased Dust and noise levels
  - iii. Increased waste during operations

**(c) Impacts associated with Demobilization Phase**

The following key issues are associated with decommissioning phase:

- Negative Social Impact
  - i. Loss of employment which might lead to poor quality of life
- Negative Environmental Impact
  - i. Production of rubble and associated disposal problems
  - ii. Noise and Dust Pollution

**2. Mitigation Measures**

Many of the mitigation measures put forward are nothing more than good engineering practice that shall be adhered to during all the project phases. Other major mitigation measures for each of the identified impacts to be observed include;

- **Higher noise levels:** Machine operators in various sections with significant noise levels shall be provided with noise protective gear.
- **Dust emission:** Trucks transporting construction materials shall be covered if the load is dry and prone to dust emissions.

- **Waste management:** The contractor shall have adequate facilities for handling the construction waste. A large Skip Bucket shall be provided at the site.
- **Health and safety of workers:** Appropriate working gear (such as nose, ear mask and clothing) and good construction site management shall be provided. During construction the contractor shall ensure that the construction site is well protected and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, firefighting and clean and safe water supply.
- **Lack of employment for local community:** The contractor shall deploy locally available labour
- **Traffic management:** Adequate sign boards will be placed at the relevant location and flag man will be assigned whenever necessary.
- **Pressure on community services such as water:** Alternative measures like use of water from Lake Victoria and nearby rivers and not portable water supplied to the community by MWAUWASA.
- **Accidents and fire incidences:** The design of the proposed project strictly adheres to the Fire Safety Standards.
- **Poor maintenance of the road and Mirongo river during operation:** A private cleanliness firm with adequate number of staff shall be commissioned to clean the road and Mirongo River surroundings daily.

## **7. Alternative Analysis**

From the environmental safeguard viewpoint, alternative analysis is an important tool for the best selection of the project site, technology to be followed, and operational mechanism in terms of environmental acceptability of the chosen method. The following alternatives have been considered by this project.

### **(a) "No action" alternative of the project**

The no project alternative entails retaining the current status quo (No improvement of the Igoma – Kishiri – Buhongwa Road and rehabilitation of Mirongo River). Adopting this option would mean avoiding most of the negative effects associated with the project and missing all the positive benefits such as benefits to communities resulting from employment during construction and increased accessibility by improved roads and reduced floods due to Mirongo River rehabilitation.

### **(b) Alternative Analysis for Selection of Sites**

The option of using another site apart from that of the proposed one was also considered. However, the Proposed site was observed to have the following advantages over others;

- The site is owned by Mwanza City Council (No need to buy a new piece of land and does not need compensation).
- The road is located on a favourite piece of land. It is surrounded by residential and institutional activities; it is in the CBD area.

**(c) Alternative Analysis for Technology and materials options**

Generation of noise from the construction activities (welding, compaction, drilling, trenching etc) will raise the noise level at the site. Thus, to prevent these adverse effects to the surrounding community, the contractor will use machines that do not generated a lot of noise. Therefore, the proposed project will employ the use of locally and internationally accepted materials and equipment to achieve public health, safety, security and environmentally aesthetic requirements.

**(d) Alternative analysis for energy options**

The use of other alternative energy sources apart from power from the National grid and diesel generators were considered. As it is the case in most of developing countries, supply of electricity from national grids is not reliable as it mostly originates from hydroelectric power generators, which depend on rainfall frequency, intensity and pattern. On the other hand, diesel generators, which are mainly used during power interruptions, emit a lot of greenhouse gases especially when they are run for a long time. Solar energy was considered, and the design team shall explore the feasibility of using this alternative.

**8. Environmental and Social Management Plan, Environmental Monitoring Plan and Auditing**

The Environmental and Social Management Plan (ESMP) is presented in the Environmental Impact Statement. The options to minimize or prevent the identified adverse social and environmental impacts as well as a monitoring plan have been suggested and they are based on good engineering practices. It also, defines roles and responsibility of different actors of the plan. The plan during the implementation of the project is important in order to measure the success of the mitigation measures. The contractor shall implement components relevant to the actual construction and operation phases. Developer shall be responsible for overall implementation of proposed Plan.



The estimated costs for implementing the mitigation measures are just indicative. Additionally, the ESPM include an estimate of the costs of the measures so that the project Developer can budget the necessary funds. Appropriate bills of quantities should clearly give the actual figures. In any case, the consultant used informed judgment to come up with these figures. The project shall ensure that the activities which are causing impacts to the environment are managed in a comprehensive, systematic, planned and documented manner. Developer shall communicate the environmental and social management plan and environmental and social monitoring plan to its employees and its contractors to ensure that implementation is done accordingly.

Furthermore, Developer shall ensure availability of resources which are required for implementation of its environmental management plan. The plan shall be monitored to ensure that environmental objectives are met Mwanza City Council shall carry out routine auditing and communicate the audit report to the top management so as to ensure continued sustainability of the environmental management system.

#### **9. Resources evaluation**

Mwanza City Council has set aside a total of over eleven (11) billion Tanzania shillings as initial cost for the improvement and construction of Igoma – Kishiri – Buhongwa Road (14km) and Mirongo River. All these funds will cover costs of civil and construction works; Information, Communication and Technology works, procurement of medical devices; and cross cutting issues. The estimated costs for implementing impact management as well as monitoring process as outlined in Environmental Impact Statement is TZS. 275,0000,000 and TZS 103,500,000 respectively. The estimated costs for mitigation do not include the environmental costs, which could not be accurately calculated. Since some of the impacts will only be realized during construction phase, the costs for these will also be short term, especially if mitigation measures are fully implemented the project benefits outweighs the project costs by far.

#### **10. Decommissioning**

As decommissioning will take place in the remote future, the specific conditions for mitigation are generally inherently uncertain. In view of this, specific mitigation measures

pertaining to environmental impacts of decommissioning works cannot be proposed at the moment with a reasonable degree of certainty. A decommissioning plan that takes environmental issues into consideration shall be prepared by the developer prior to the decommissioning works. Should it be done, decommissioning may entail a change of use (functional changes) or demolition triggered by change of land use.

### **11. Summary and Conclusion**

The proposed upgrading Igoma – Kishiri – Buhongwa Road (14km) and rehabilitation Mirongo River in Mwanza City Council, Mwanza region. The project has large socio-economic benefits to both the Mwanza City Council and the nation at large. The project as such, entails minimal adverse environmental impacts of which adequate mitigation measures have been proposed and incorporated in the project design. It can therefore be concluded that, the proposed project will entail no significant impacts provided that the recommended mitigation measures are adequately and timely implemented. The identified impacts will be managed through the proposed mitigation measures and implementation regime laid down in this ESIA. The proponent is committed in implementing all the recommendations given in this ESIA and further carrying out the environmental auditing and monitoring schedules.

**MUHTASARI USIOKUWA WA KIUFUNDI WA TATHMINI YA  
ATHARI ZA MAZINGIRA NA JAMII ZA UBORESHAJI WA KM 14 ZA  
BARABARA YA IGOMA – KISHIRI – BUHONGWA KATIKA KATA  
ZA IGOMA, KISHIR, LWAHNIMA NA BUHONGWA NA KM 5.9 ZA  
MTO MIRONGO KATIKA KATA ZA NYAMAGANA, MIRONGO,  
PAMBA, MBUGANI, MABATINI, MAHINA NA MHANDU KATIKA  
JIJI LA MWANZA, MKOA WA MWANZA**

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**TAREHE YA KUWASILISHA: 15 MEI 2023**

## MUHTASARI USIO WA KIUFUNDI

### 1. Kichwa na eneo la mradi/shughuli

Tathmini ya Athari za Kimazingira na Kijamii kwa mapendekezo ya Uboreshaji wa Km 14 za Barabara ya Igoma – Kishiri – Buhongwa katika Kata za Igoma, Kishiri, Lwahnima na Buhongwa na Km 5.9 za Mto Mirongo katika Kata za Nyamagana, Mirongo, Pamba, Mbugani, Mabatini, Mahina na Mhandu katika Jiji la Mwanza, Mkoa wa Mwanza.

### 2. Jina la Mwekezaji na anwani

Halmashauri ya Jiji Mwanza

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### 3. Majina na anuani ya Mtaalamu iliyofanya TAM

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### 4. Muhtasari mfupi na uhalali wa mradi unaopendekezwa

#### (a) Maelezo mafupi ya mazingira ya mradi

Serikali ya Jamhuri ya Muungano wa Tanzania kwa kushirikiana na wadau wa maendeleo inatarajia kufadhili uboreshaji wa barabara ya Igoma – Kishiri – Buhongwa na Mto Mirongo katika jiji la Mwanza ikiwa ni sehemu ya mradi wa maboresho ya miundombinu na ushindani wa Miji Tanzania (TACTIC) unaofadhiliwa na Benki ya Dunia (WB). Japokuwa Mwanza ni jiji linalokua kwa kasi ikiwa maeneo yake mengi yameendelea na yametwaliwa, bado kuna maeneo hayafikiki kirahisi hivyo kusababisha foleni kwenye barabara zinazopitika. Barabara ya Igoma – Kishiri – Buhongwa haina ubora sababu ya mashimo na kutokua na mifereji ya maji ya mvua hivyo kupelekea mafuriko kipindi cha mvua na vumbi kipindi cha kiangazi. Uboreshwaji wa barabara hii utasaidia kupunguza foleni, utarahisisha usafirishaji wa taka ngumu kwenda dampo la Buhongwa, itahudumia jamii kubwa kwenye maeneo hayo kwa kupunguza mafuriko na vumbi. Uboreshwaji wa mto Mirongo utasaidia kupunguza mafuriko kutokana na mabidiliko ya tabia nchi na ongezeko la shughuli za binadamu na kusababisha madhara kwa jamii na miundombinu.

Tathmini ya Athari kwa Mazingira (TAM) ilifanyika kwa mujibu wa Sheria ya Usimamizi wa Mazingira (Sura ya 191) na Kanuni za Usimamizi wa Mazingira (Tathmini na Ukaguzi wa Athari kwa Mazingira) za 2005 kama ilivyorekebishwa mwaka wa 2018. Kanuni hizo zinaipa NEMC mamlaka ya kusimamia mchakato wa TAM, ambao unafikia kilele, pamoja na kutunukiwa Cheti cha Tathmini ya Athari kwa Mazingira na Ofisi ya Makamu wa Rais - Wizara yenye dhamana ya Mazingira. Cheti cha Tathmini ya Athari kwa Mazingira ni miongoni mwa vibali vya lazima vinavyohitajika kabla ya kuanza kwa ujenzi wa mradi. Mradi huu pia utahitaji cheti hiki kabla ya utekelezaji wake.

#### **(b) Maelezo ya Mradi**

Mradi utakuwa na vipengele viwili, uboreshaji wa barabara ya Igoma – Kishiri – Buhongwa na mto Mirongo. Barabara ya Igoma – Kishiri – Buhongwa (km 14) inapita kwnye kata za Igoma, Kishiri, Lwahnima hadi Buhongwa. Barabara hii inganisha sehemu ya kati ya Jiji la Mwanza mpaka Barabara za Shinyanya na Musoma hivyo ni ya muhimu kiuchumi kwa jiji. Barabara hiyo tarajiwa inapita maeneo ambayo ni nyeti kama makazi ya watu, biasharaaa, mashamba pamoja na miundombinu ya kama nguzo za TANESCO na mabomba ya maji ambayo yanaweza kuathiriwa kipindi cha utekelezaji wa mradi. Kulingana na mpango mkuu wa jiji ulioandaliwa kwa ajili ya baabara hii kipindi cha utafiti wa awali na usanifu; haki ya njia kutoka Buhongwa mpaka Kishiri ni mita 50 kuanzia katikati ya barabara ambapo Kishiri mpaka Igoma na Kishiri mpaka Ukwoju haki ya njia ni mita 20. Mto Mirongo upo ndani ya Jiji la Mwanza na unapita kata saba za Nyamagana, Mirongo, Pamba, Mbugani, Mabatini, Mahina na Mhandu. Mto huo una urefu wa km 5.9. Mto utakuwa na upana wa mita 20 na bafa ya mita 10 kila upande: hata hivyo, hii sio hali halisi ambapo kwa sasa bafa ni mita 5 mpaka 10 kila upande sababu ya miundo iliyopo (kama maghorofa). Halmashauri ya Jiji la Mwanza wanataka kuboresha Mto Mirongo na kupunguza shughuli za kibinadamu ili kuzuia mafuriko maji yanapoelekea kwa kutoa/ kupunguza michanga kwenye mto. Pia, halmashauri ya jiji ina mpango wa kupendezesha maeneo pembezoni mwa mto kwa ajili ya mapumziko/burudani na kutengeneza mapato kutokana na ada zitakazo kusanywa.

Kwa kuwa mradi huu pendekezwa ni huduma ya jamii hivyo unatarajiwa kuleta faida kwa watu wengi kutoka kona mbalimbali za Mwanza ambao watatumia barabara kusafiri kutoka sehemu moja kwenda nyingine kwa shughuli mbalimbali na pia kupunguza mafuriko kwenye Mto Mirongo. Halmashauri ya Jiji la Mwanza, Wizara ya Fedha, TAMISEMI na Sekta ya Uchukuzi na Idara ya Kazi ndio wahasika wakuu katika uandaaji na usimamizi wa fedha kabla na wakati wa ujenzi. Mradi unaopendekezwa utahudumia wakazi wa Halmashauri ya

Jiji la Mwanza na wadau wote wa sekta ya uvuvi kwa takribani zaidi ya miaka 30 baada ya kukamilika.

## **5. Mfumo wa Sera, Sheria na Kitaasisi**

Sera na sheria mbalimbali ambazo zinahusiana na zinaongoza utekelezaji wa mradi huu ni pamoja na Dira ya Maendeleo ya Tanzania 2025, Sera ya Taifa ya Mazingira ya 2021, Sera ya uchukuzi (2003), Sera ya Sekta ya Ujenzi (2003), Sera ya Taifa ya Ardhi (1995), Sera ya Taifa ya Jinsia (2002), Sera ya kukuza Uwekezaji (2003) na Sheria ya Usimamizi wa Mazingira (Sura ya 191), 2004, na Kanuni za Tathmini na Ukaguzi wa Athari kwa Mazingira (2005) kama ilivyorekebisha mwaka 2018. Sheria nyingine ni kama vile; Sheria ya Majisafi na Usafi wa Mazingira (2019), Sheria ya Ardhi namba 4 ya 1999, Sheria ya Mipango Miji (2007), Sheria ya Afya na Usalama Kazini (2003), Sheria ya Ajira na Mahusiano Kazini (2015), Sheria ya Usajili Wahandisi (2007), Sheria ya Usajili wa Makandarasi (1997), Sheria ya Serikali za Mitaa (Mamlaka za Mijini) (Sura ya 288), Sheria ya Wasanifu Majengo na Wakadiriaji Majenzi (1997), na Sheria ya VVU na UKIMWI (Kinga na Kudhibiti) (2008).

Pia kuna Mfumo wa usimamizi wa mazingira na jamii wa Benki ya Dunia unaoeleza Viwango kumi (10) vya Mazingira na Kijamii ambavyo vinapaswa kufuatwa wakati wa utekelezaji wa miradi hususani ile inayofadhiliwa na Benki ya Dunia. ESS1: Tathmini na usimamizi wa Hatari na Athari za Mazingira na Kijamii; ESS2: Masuala ya Ajira na Mazingira ya Kazi; ESS3: Ufanisi wa Rasilimali na Kuzuia na Kusimamia Uchafuzi; ESS4: Afya na Usalama ya Jamii; ESS5: Utwaaji wa Ardhi, Vizuizi vya Matumizi ya Ardhi na Uhamishaji wa Watu na Makazi bila Hiari; ESS6: Uhifadhi wa Bioanuwai na Usimamizi Endelevu wa Maliasili Hai; ESS7: Wenyeji/Jamii za wenyeji zenye mfumo wa kiasili wa maisha za Kiafrika Kusini mwa Jangwa la Sahara ambazo Kihistoria zimekuwa haziangaliwi kwenye masuala ya maendeleo kutokana na mfumo wao wa Maisha na tamaduni zao; ESS8: Urithi wa Kitamaduni; ESS9: Waamuzi wa Fedha; na ESS10: Ushirikishaji wa Wadau na upashanaji wa habari/taarifa.

Kwa kuzingatia asili ya shughuli za mradi huu, isipokuwa ESS9: Waamuzi wa Kifedha; karibu ESS zote zinahusika katika mradi huu. Mfumo wa Mazingira na Jamii wa Benki ya Dunia unaweka wazi dhamira ya Benki ya maendeleo endelevu, kupitia Sera ya Benki na seti ya viwango vya Mazingira na Kijamii ambavyo vimeundwa kusaidia miradi ya Wakopaji, kwa lengo la kumaliza umaskini uliokithiri na kukuza ustawi wa pamoja. Mfumo wa E&S unajumuisha: (1) Dira ya Maendeleo Endelevu, ambayo inaweka wazi matarajio ya Benki

kuhusu uendelevu wa mazingira na kijamii; (2) Sera ya Benki ya Dunia ya Mazingira na Kijamii inaweka masharti na vigezo vya lazima vya kimazingira na kijamii ambavyo Miradi ya Uwekezaji, inayofadhiliwa na Benki ni lazima ikidhi; na (3) Viwango vya Mazingira na Kijamii, pamoja na Viambatanisho vyake, ambavyo vinaweka mahitaji ya lazima yanayotumika kwa Mkopaji na miradi. Hati nyingine ni Miongozo ya Benki ya Dunia ya Mazingira, Kijamii, Afya na Usalama.

#### **6. Mashauriano ya Wadau na Ushirikishwaji wa Umma na matokeo**

Kwa ujumla, maoni ya wadau wengi yanaunga mkono mradi uliopendekezwa. Maoni yote yaliyopokelewa kutoka kwa wadau yalikusanywa, kufupishwa na kupangwa ili kuainisha masuala mbalimbali ambayo yameshughulikiwa katika Tathmini kamili na ya kina ya Athari kwa Mazingira. Jedwali lenye ratiba ya ziara lilitayarishwa ili kuiongoza timu kushauriana na wadau wote waliotambuliwa. Wadau walitambuliwa kwa kutumia mbinu rahisi kama vile majadiliano ya vikundi na usaili wa watoa taarifa muhimu wenye uelewa mkubwa wa mradi. Katika mchakato wote wa mashauriano ya wadau mjadala wa kitaalamu ulikuwa muhimu hasa wakati wa kuchunguza na kutathmini masuala ya kiufundi. Wadau hao waliobainika ni pamoja na Ofisi ya Rais Tawala za Mikoa na Serikali za Mitaa (Kitengo cha Uratibu wa Miradi), Halmashauri ya Jiji la Mwanza, Mamlaka ya Majisafi na Usafi wa Mazingira Mwanza (MWAUWASA), Wakala wa Huduma za Misitu (TFS) ,Shirika la usambazaji umeme Tanzania (TANESCO), Kikundi cha usimamizi wa ufuko wa Ziwa Victoria (BMU), Jumuiya ya Watu Wenye Ulemavu, Viongozi wa Kata na Mtaa pamoja na majirani.

#### **Masuala makuu na maangalizo yaliyotolewa yalikuwa:**

- Kuzidiwa kwa huduma za kijamii kutokana na ongezeko la watu;
- Fursa za ajira;
- Usanifu wa barabara na mto Mirongo kuzingatia mabadiliko ya hali ya hewa;
- Uchafuzi wa vumbi na kelele;
- Changamoto ya udhibiti wa taka wakati wa awamu ya ujenzi na uendeshaji; na
- Kutoa kipaumbele kwa wenyeji kwenye masuala ya kazi na ajira hasa wakati wa ujenzi.

#### **7. Tathmini ya Athari**

Uainishaji wa athari katika TAM hii ulilenga kuhakikisha kuwa athari zote muhimu zinazoweza kutokea zina ainishwa na kushughulikiwa. Timu ya TAM ilitumia zana kutambua athari mbalimbali hasa athari mbaya. Athari hizi zilibainishwa wakati wa mikutano ya

mashauriano ya wadau, mahojiano, mapitio ya maandiko na uchunguzi. Baadhi ya maswala/athari zilizoainishwa kwa hivyo zilichukuliwa kuwa ni athari zinazorekebisha.

**(a) Awamu ya Uhamasishaji na Ujenzi**

**• Faida Chanya za Kijamii**

- i. Manufaa kwa jamii yanayotokana na ajira kipindi cha ujenzi
- ii. Faida kwa wafanyabiashara kutokana na uboreshaji wa barabara hivyo kuweza kupitika.

**• Athari Hasi za Kijamii**

- i. VVU/UKIMWI miongoni mwa wafanyakazi na jamii ziishizo Jirani na eneo la mradi
- ii. Usalama wa jamii unaosababishwa na kufurika kwa wafanyakazi
- iii. Mimba zisizohitajika

**• Faida Chanya za Mazingira**

- i. Mazingira yaliyooboreshwa ambayo yana mfumo wa kawaida wa mifereji ya maji
- ii. Kuboresha ubora wa hewa kutokana na kuweka ukanda wa kijani (upandaji wa miti ya kivuli na mapambo)
- iii. Kupunguza mafuriko katika mto Mirongo

**• Athari Hasi za Mazingira**

- i. Kupoteza uoto wa asili
- ii. Kuongezeka kwa viwango vya vumbi na kelele
- iii. Ongezeko la taka na matatizo ya usimamizi wa taka wakati wa ujenzi
- iv. Hatari za usalama na afya
- v. Ongezeko la watu wanaotafuta fursa za ajira na biashara katika eneo la mradi
- vi. Athari zitokanazo na mitetemo

**(b) Athari zinazohusiana na Awamu ya Operesheni**

**• Faida Chanya za Kijamii**

- i. Kuongezeka kwa fursa za ajira na kuboreka kwa viwango vya maisha kwa jamii
- ii. Urahisi wa kufika maeneo ya mradi
- iii. Kuboreshwa kwa huduma za kijamii
- iv. Kuongezeka kwa thamani ya ardhi na maendeleo



**• Athari Hasi za Kijamii**

- i. Kuongezeka kwa maambukizi ya VVU/UKIMWI miongoni mwa wafanyakazi na jamii ziishizo karibu na mradi.
- ii. Hatari za kiafya na usalama wa jamii unaosababishwa na shughuli za mradi
- iii. Mimba zisizohitajika.

**• Faida Chanya za Mazingira**

- i. Mazingira yaliyooboreshwa ikiwemo mifumo ya mifereji ya uondoshaji ya maji ya mvua.
- ii. Huduma bora za usafirishaji wa abiria na mizigo
- iii. Kuboresha ubora wa hewa kutokana na kijani kibichi kinachotarajiwa.

**• Athari Hasi za Mazingira**

- i. Kuongezeka kwa shinikizo kwenye huduma za kijamii na huduma
- ii. Kuongezeka kwa viwango vya vumbi na kelele
- iii. Kuongezeka kwa taka wakati wa uendeshaji wa mradi

**(c) Athari zinazohusiana na Awamu ya ufungaji wa mradi**

**Masuala muhimu yafuatayo yanahusishwa na awamu ya kufunga mradi:**

**• Athari Hasi za Kijamii**

- i. Kupoteza ajira ambayo inaweza kusababisha hali duni ya maisha

**• Athari Hasi kwa Mazingira**

- i. Uzalishaji wa kifusi na matatizo yanayohusiana na utupaji wa taka za ujenzi
- ii. Kelele na Uchafuzi wa utokanao na vumbi

**2. Hatua za Kukabiliana**

Mradi huu umezingatia njia mbalimbali za kuweza kukabiliana na athari zitokanazo na shughuli za ujenzi wa wa mradi katika awamu zote. Njia nyingi ni zile zinazohusiana na kuwepo kwa mfumo mzuri na miongozo ya kukabiliana na athari katika hatua zote za mradi kulingana na aina ya athari husika kama zilizoainishwa hapa chini.

- **Viwango vya juu vya Kelele:** Vifaa na mitambo yote ya ujenzi itafanyiwa ukaguzi na marekebisho ya mara kwa mara kama ilivyoelekezwa katika vijitavu vya maelekezo ya kifaa/mtambo husika. Waendeshaji mashine katika sehemu mbalimbali zilizo na viwango

vikubwa vya kelele watapewa vifaa vya kuzuia kelele. Shuguli za mradi zinazohusisha mitambo yenye viwango vikubwa vya kelele zitafanyika nyakati za mchana.

- **Uchafuzi wa hewa kwa njia ya vumbi:** Malori yanayosafirisha malighafi na vifaa vya ujenzi yatafunikwa ikiwa mzigo ni mkavu na unaweza kusababisha utoaji wa vumbi. Wafanyakazi walio katika maeneo yenye viwango vikubwa vya vumbi watapewa vifaa vya kujikinga na vumbi. Unyunyuzaji wa maji utafanyika mara kwa mara katika sehemu zote za kazi za ujenzi wa barabara za kuingia na kutoka katika eneo la mradi pamoja na katika maeneo yote ya machimbo ya malighafi za ujenzi. Kwa kuongezea, sehemu za barabara zinazopitiwa sana na magari ya ujenzi pia zitanyunyuziwa maji mara kwa mara.
- **Ongezeko la taka:** Mkandarasi ataandaa mpango maalumu wa udhibiti wa taka zitakazozalishwa wakati wa shughuli za ujenzi wa mradi. Mkandarasi atahakikisha kuwa vifaa vifaa vya kutosha vya kukusanyia taka za ujenzi vimewekwa katika maeneo yote muhimu ndani ya eneo la mradi ikiwemo vizimba na mapipa makubwa ya kukusanyia taka. Pia Mkandarasi atahakikisha kuwa, taka zilizokusanywa katika eneo la mradi zinaondolewa kwa wakati na kwenda kutupwa katika maeneo maalumu ya kutupia taka katika jiji la Mwanza. Wakandarasi waliosajiliwa na Baraza la Mazingira la Taifa tu ndio watakao husika na ukusanyaji na uondoshwaji wa taka katika eneo la mradi.
- **Afya na usalama wa wafanyakazi:** Vifaa vya kujikinga na hatari mbalimbali mahala pa kazi vitagaiwa kwa wafanyakazi kulingana na aina ya kazi wanazofanya (kama vile barakoa, vizuizi vya kelele vya kuvaa masikioni, mavazi maalum ya kazi, kofia ngumu, miwani inayofunika macho vizuri, viatu vigumu n.k.) na usimamizi mzuri wa kambi za wafanyakazi utazingatiwa. Wakati wa ujenzi mkandarasi atahakikisha kuwa eneo la ujenzi limezungushiwa uzio na kuhifadhiwa kwa usafi na vifaa vya kutosha ikiwa ni pamoja na vyombo vya kutupa taka, maji taka, zima moto na usambazaji wa maji safi na salama.
- **Fursa za ajira kwa jamii ya wenyeji:** Mkandarasi ataandaa mpango wa ajira na kazi ambapo ataainisha idadi na aina ya fursa za ajira zitakazotolewa kwa wanachi waishio jirani na mradi.
- **Shinikizo kwa huduma za jamii kama vile maji:** Maji yatakayo tumika kipindi cha ujenzi yatoka Ziwa Victoria au mito iliyopo karibu na sio yanayosambazwa kwa jamii na MWAUWASA.
- **Ajali na matukio ya moto:** Mradi pendekezwa utazingatia kikamilifu Viwango vya Usalama wa Moto.

- **Matengenezo duni ya barabara na Mto Mirongo wakati wa operesheni:** Kampuni ya kibinafsi ya usafi yenye idadi ya kutosha ya wafanyakazi itaajiriwa kusafisha barabara na mto Mirongo pamoja na mazingira yanayozunguka kila siku.

## **8. Uchambuzi Mbadala**

Kutoka kwa mtazamo wa ulinzi wa mazingira, uchambuzi mbadala ni nyenzo muhimu kwa uteuzi bora wa eneo la mbadala la mradi, teknolojia ya kufuatwa wakati wa ujenzi na uendeshaji, na gharama zitokanazo na mbadala husika. Njia mbadala zifuatazo zimezingatiwa na mradi huu.

### **a) "Hakuna hatua" mbadala ya mradi**

Hakuna mbadala wa mradi unahusu kubaki na hali ilivyo sasa (Hakuna ujenzi wa barabara ya Igoma – Kishiri – Buhongwa na uboreshaji wa Mto Mirongo). Kupitisha chaguo hili kunaweza kumaanisha kuepuka athari nyingi mbaya zinazohusiana na uwepo wa mradi na kukosa manufaa yote chanya kama vile manufaa kwa jamii yanayotokana na ajira wakati wa ujenzi na urahisi wa kusafiri kutokana na barabara bora na kupungua kwa mafuriko sababu ya uboreshaji wa Mto Mirongo.

### **b) Uchambuzi Mbadala wa Uchaguzi wa Maeneo**

Chaguo la kutumia eneo jingine la mradi mbali na ile lililopendekezwa pia ilizingatiwa. Hata hivyo, uchaguzi huu ulionekana kuwa na faida zifuatazo juu ya nyingine;

- Kiwanja kinamilikiwa na Halmashauri ya Jiji la Mwanza (Hakuna haja ya kununua kipande kipya cha ardhi na hakihitaji fidia).
- Kiwanja kiko kwenye kipande cha ardhi unachopenda. Imezungukwa na shughuli za makazi na taasisi; iko katika eneo la kibiashara la katikati ya mji.

### **c) Uchambuzi Mbadala kwa ajili ya chaguzi za Teknolojia na nyenzo**

Kuzalisha kelele kutoka kwa shughuli za ujenzi (kulehemu, kukandamiza, kuchimba visima, kuchimba mitaro nk) kutaongeza kiwango cha kelele kwenye tovuti. Hivyo, ili kuzuia athari hizi mbaya kwa jamii inayowazunguka, mkandarasi atatumia mashine ambazo hazitoi kelele nyingi. Kwa hivyo, mradi uliopendekezwa utatumia matumizi ya vifaa vinavyokubalika ndani na kimataifa ili kufikia mahitaji ya afya ya umma, usalama, usalama na uzuri wa mazingira.

### **d) Uchambuzi mbadala wa chaguzi za nishati**

Matumizi ya vyanzo vingine vya nishati mbadala mbali na umeme kutoka gridi ya Taifa na jenereta za dizeli yalizingatiwa. Kama ilivyo katika nchi nyingi zinazoendelea, usambazaji wa umeme kutoka gridi za taifa si wa kutegemewa kwani mara nyingi hutoka kwa jenereta za umeme zinazotokana na maji, ambazo hutegemea kiwango cha mvua, ukubwa na muundo. Kwa upande mwingine, jenereta za dizeli, ambazo hutumiwa hasa wakati wa kukatika kwa umeme, hutoa gesi nyingi chafu hasa wakati zinaendeshwa kwa muda mrefu. Nishati ya jua ilizingatiwa na timu ya kubuni itachunguza uwezekano wa kutumia mbadala huu.

### **9. Mpango wa Usimamizi wa Mazingira na Kijamii, Mpango wa Ufuatiliaji wa Mazingira na Ukaguzi**

Mpango wa Usimamizi wa Mazingira na Kijamii umewasilishwa katika Taarifa ya Athari kwa Mazingira. Chaguo za kupunguza au kuzuia athari mbaya za kijamii na kimazingira zilizotambuliwa pamoja na mpango wa ufuatiliaji zimependekezwa na zinatokana na mazoea mazuri ya uhandisi. Pia, inafafanua majukumu na wajibu wa watendaji mbalimbali wa mpango. Mpango wakati wa utekelezaji wa mradi ni muhimu ili kupima mafanikio ya hatua za kupunguza. Mkandarasi atatekeleza vipengele vinavyohusika na awamu halisi za ujenzi na uendeshaji. Msanidi atawajibika kwa utekelezaji wa jumla wa Mpango uliopendekezwa.

Gharama zilizokadiriwa za kutekeleza hatua za kupunguza ni dalili tu. Zaidi ya hayo, Mpango wa Usimamizi inajumuisha makadirio ya gharama za hatua ili Msanidi wa mradi aweze kupanga bajeti ya fedha zinazohitajika. Bili zinazofaa za kiasi zinapaswa kutoa takwimu halisi. Kwa hali yoyote, mshauri alitumia uamuzi sahihi kuja na takwimu hizi. Mradi utahakikisha kwamba shughuli zinazosababisha athari kwa mazingira zinasimamiwa kwa kina, utaratibu, mipango na kumbukumbu. Msanidi programu atawasilisha mpango wa usimamizi wa mazingira na kijamii na mpango wa ufuatiliaji wa mazingira na kijamii kwa wafanyikazi wake na wakandarasi wake ili kuhakikisha kuwa utekelezaji unafanywa ipasavyo.

Zaidi ya hayo, Msanidi programu atahakikisha upatikanaji wa rasilimali ambazo zinahitajika kwa ajili ya utekelezaji wa mpango wake wa usimamizi wa mazingira. Mpango huo utafuatiliwa ili kuhakikisha kuwa malengo ya mazingira yanafikiwa. Halmashauri ya Jiji la Mwanza itafanya ukaguzi wa kawaida na kuwasilisha taarifa ya ukaguzi kwa uongozi wa juu ili kuhakikisha uendeleu wa mfumo wa usimamizi wa mazingira.

### **10. Tathmini ya rasilimali**

Halmashauri ya Jiji la Mwanza imetenga jumla ya zaidi ya shilingi bilioni kumi na moja (11) za Tanzania kama gharama za awali za uendelezaji na ujenzi wa Igoma – Kishiri – Buhongwa Road (km 14) na Mto Mirongo. Fedha hizi zote zitagharamia kazi za kiraia na ujenzi; kazi za umeme na Habari, Mawasiliano na Teknolojia, ununuzi wa vifaa tiba; na masuala mtambuka. Makadirio ya gharama za utekelezaji wa usimamizi wa athari pamoja na mchakato wa ufuatiliaji kama ilivyoainishwa katika Taarifa ya Athari kwa Mazingira ni shilingi za Kitanzania 275,000,000.00 na 103,500,000.00 mtawaalia. Gharama zilizokadiriwa za kupunguza hazijumuishi gharama za mazingira, ambazo hazikuweza kuhesabiwa kwa usahihi. Kwa kuwa baadhi ya athari zitapatikana tu wakati wa awamu ya ujenzi, gharama za hizi pia zitakuwa za muda mfupi, haswa ikiwa hatua za kupunguza zitatekelezwa kikamilifu faida za mradi zitazidi gharama za mradi kwa mbali.

### **11. Kufungwa kwa mradi**

Kwa vile uondoaji utafanyika katika siku zijazo za mbali, hatua mahususi za kupunguza zinazohusu athari za kimazingira za kazi za uondoaji kazi haziwezi kupendekezwa kwa sasa kwa kiwango cha uhakika. Mpango wa uondoaji unaozingatia masuala ya mazingira utatayarishwa na msanidi programu kabla ya kazi za uondoaji. Iwapo itafanyika, uondoaji unaweza kuhusisha mabadiliko ya matumizi (mabadiliko ya kiutendaji) au ubomoaji unaosababishwa na mabadiliko ya matumizi ya ardhi.

### **12. Muhtasari na Hitimisho**

Pendekezo la uboreshaji wa barabara ya Igoma – Kishiri – Buhongwa (km 14) na Mto Mirongo jijini Mwanza, Mkoa wa Mwanza. Mradi huo una manufaa makubwa ya kijamii na kiuchumi kwa halmashauri ya jiji la Mwanza na taifa kwa ujumla. Mradi kama huo, unahusisha athari ndogo mbaya za kimazingira ambapo hatua za kutosha za kukabiliana nazo zimependekezwa na kujumuishwa katika muundo wa mradi. Kwa hivyo inaweza kuhitimishwa kuwa, mradi uliopendekezwa hautajumuisha athari kubwa mradi hatua zilizopendekezwa za kupunguza zinatekelezwa vya kutosha na kwa wakati. Athari zilizoainishwa zitadhibitiwa kupitia mapendekezo ya hatua za kupunguza na mfumo wa utekelezaji uliowekwa katika TAM hii. Mwekezaji amejitolea kutekeleza mapendekezo yote yaliyotolewa katika TAM hii na kutekeleza zaidi ratiba za ukaguzi na ufuatiliaji wa mazingira.