ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT FOR THE PROPOSED UPGRADING OF BUSWELU - BUSENGA - COCA COLA/MUSOMA ROAD (3.3KM) IN IGOMA WARD AND BUSWELU-NYAMADOKE-NYAMHONGOLO ROAD (9.5KM) LOCATED IN BUSWELU AND NYAMHONGOLO WARDS, ILEMELA MUNICIPALITY IN MWANZA REGION

FINAL REPORT

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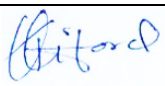
1.	Rosemary C. Nyirenda	Environmental Expert and ESIA Team Leader	NEMC/PC/EIA/2021 /0075	
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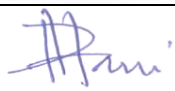
5.	Dorcas Ephraim	Economist		

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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
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
EIA	Environmental Impact Assessment
EHS	Environment Health and Safety
EIS	Environmental Impacts Statement
EMA	Environmental Management Act
EMP	Environmental Management Plan
ERB	Engineering Registration Board
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
EWURA	Energy, Water Utilities Regulation Authority
FYDP	Five Year Development Plan
GN	Government Notice
GoT	Government of the United Republic of Tanzania
GRM	Grievance Redress Mechanism
GRC	Grievance Redress Committee
GN	Government Notice
GoT	Government of the United Republic of Tanzania
HBC	Home Based Care
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome
IA	Implementing Agency
IMC	Ilemela Municipal Council
LGA	Local Government Authority
MWAUWASA	Mwanza Urban Water 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
PEDP	Primary Education Development Programme
PLHAS	People Living with HIV/AIDS
PMTCT	Prevention of Mother to Child Transmission
PO-RALG	Prime Minister's Office, Regional Administration and Local Government
PwD	People with Disability

RoW	Right of Way
SACCOS	Credit Co-operative Societies
SEP	Stakeholder Engagement Plan
SIA	Social Impacts Assessment
STD	Sexually Transmitted Diseases
STI	Sexual Transmitted Infections
TAC	Technical Advisory Committee
TACAIDS	Tanzania Commission for Aids
TACTIC	Tanzania Cities Transforming Infrastructure and Competitiveness
TANESCO	Tanzania Electric Supply Company Ltd
TRL	Tanzania Railways Limited
TTCL	Tanzania Telecommunucation Company Ltd
ToR	Terms of Reference
WB	World Bank
VCT	Voluntary Counselling Treatment
WHO-GPA	World Health Organization Global Programme on AIDS

EXECUTIVE SUMMARY

Environmental and Social Impact Statement EIS for the Proposed Upgrading of Buswelu - Busenga - Coca Cola Road/Musoma Road (3.3km) in Igoma ward and Buswelu-Nyamadoke-Nyamhongolo Roads (9.5km) at Busweru and Nyamhongoro wards, Ilemela Municipality in Mwanza Region

Proponent: Ilemela Municipal Council

Proponent's Contact: Director,
Ilemela Municipal Council

Project Background and Rationale

The Ilemela Municipal Council (IMC) was established in 2012 after the split of the former Mwanza City Council and it is one of the eight local government authorities of the Mwanza Region. The council has the area of 1080.55 Sq. Kms out of which 828.45 Sq. Kms (77 Percent) are covered by water body (Lake Victoria) and 252.10 Kms (23 Percent) is land. Ilemela lies in the southern shores of Lake Victoria, located between Latitude $2^0$15'and $2^0$3' South of the Equator and Longitude $32^0$45' and - $33^0$2' East of Greenwich (URT, 2017). Administratively, the Council comprises of 19 wards namely: Ilemela, Bugogwa, Sangabuye, Kayenze, Nyamanoro, Kirumba, Kitangiri, Pansiasi, Buswelu, Nyamhongolo, Nyakato, Buzuruga, Mecco, Nyasaka, Shibula, Kahama, Kawekamo, Ibungilo and Kiseke. In the east, it borders the Magu district, and Mwanza city council in the South while in the North and West, there is Lake Victoria.

About TACTIC Project

Ilemela Municipal Council as the Implementing Agency (IA) is part of the LGAs which will be implementing 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. Ilemela Municipal Council is grouped in Tier 1 as among the 12 larger, fast-growing LGAs.

To attain its vision of *"having a strong economic base for provision of high quality and equitable socio-economic services for sustainable development of the community",* Ilemela plans to implement some community infrastructure and road projects under TACTIC – Tanzania Cities Transforming Infrastructure and Competitiveness (TACTIC) program. TACTIC aims at strengthening urban management performance and deliver improved basic infrastructure and services.

The TACTIC project will provide funding to cover for the following projects in Ilemela Municipal Council:

- Upgrading of Kirumba Central Market and its surrounding access roads (2.9 km): namely Vuka Road - 0.370 km; Msikitini Road - 0.289 km; Zenze Road - 0.239 km; Bismark Road - 0.209 km; Furahisha Uwanjani Road - 0.370 km; KVCC Road - 0.350 km; Mbugani Road - 0.240 km and Kirumba Sokoni Roads - 0.883 km
- Improvement of Buswelu - Busenga - Coca Cola Road/Musoma Road at Igoma (3.3 km) and Buswelu-Nyamadoke-Nyamhongolo Road (9.5km).

Environmental and Social Impact Assessment

This environmental and social finding covers for the upgrading of Buswelu - Busenga - Coca Cola Road/Musoma Road at Igoma (3.3 km) and Buswelu-Nyamadoke-Nyamhongolo Road (9.5km). 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 EIA process, which culminates with an award of the EIA certificate by the Ministry responsible for Environment. The EIA 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.

Brief Description of Project Environment

The project will focus on the upgrading of Buswelu - Busenga - Coca Cola Road/Musoma Road at Igoma (3.3 km) and Buswelu-Nyamadoke-Nyamhongolo Road (9.5km). The project will assist the community along the project and nearby community to interact easily to the CBD 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.

Project Components

The upgrading of Buswelu - Busenga - Coca Cola Road/Musoma Road at Igoma (3.3 km) and Buswelu-Nyamadoke-Nyamhongolo Road (9.5km) is important because the road connects the Buswelu to Igoma (Coca Cola Road/Musoma Road), critical in terms of economic impact and urban development while the later connects the Tanzania Strategic Cities Projects – Additional Financing 2 (TSCP – AF2) roads which connect with Musoma road, access to the newly constructed Ilemela bus terminal, serves significant number of communities and ease traffic.

Project Design

To overcome the long-time existing problem of the poor roads and drainages in Ilemela Municpal Council, the municipality is planning to construct the total of 12.8km of roads in a tarmac standard which will include:
-Storm water drainage
-Culverts
-Traffic and Street lights
-Road marking and road signs
-A road parking slots and Bus bays.

Project Stakeholders and their involvement in the ESIA Process

The following group of stakeholders were consulted

- Ilemela Municipal Council
- Mwanza Water Supply and Sanitation Authority (MWAUWASA)
- TARURA – Mwanza region
- TANESCO –Mwanza Region
- Buswelu and Nyamhongolo ward leaders
- Mitaa leaders in the project areas
- Local communities
- Petty traders along the proposed roads

The following issues were raised by stakeholders,

- Relocation of the Utilities/Infrastructure; The project site has utilities crossing or running parallel such as those for TANESCO, MWAUWASA, TRL and TTCL. It was observed that the cost for relocation of the infrastructures is incurred by developer (IMC) and must be part of the budget for the proposed project. These authorities/companies must be involved from the initial stages of the project planning and execution.

- Soil/Water/Air Pollution; during construction, the contractor should be careful with the rivers/streams by avoiding spillage of oil, haphazard dumping of waste, dust generation and emission of air pollutants from machineries.

- Compensation of affected properties; Even though the proposed road shall maintain the same existing alignment although the stakeholders are still worried that some properties shall be affected. 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

Potential Environmental and Social Impacts

The following impacts were identified to be likely to occur during pre-construction phase of the proposed road projects;

Positive Social Impacts

i. Employment opportunities (in construction works)

Positive Environmental Impacts

ii. Change of scenery view of the project areas

Negative Social Impacts

iii. Loss of property (shop structures)

Negative Environmental Impacts

iv. Increased generation of dust and air pollution
v. Traffic flow disruption and congestion

The following impacts were identified to be likely to occur during construction phase of the proposed road projects;

Positive Social Impacts

i. Employment opportunities (in construction works)

Negative Social Imoacts

ii. Interuption or lack of utility servives due to damage/relocation of existing utility infrastructure
iii. Overburdened local authority and social services (utilities)
iv. Child labour
v. Increased spread of communicable disease especially HIV/AIDS
vi. Population Influx

Negative Environmental Impacts

vii. Increased generation of dust and air pollution
viii. Increased generation noise and vibrations
ix. Visual intrusion during construction
x. Increased waste generation
xi. Loss of definite materials and land degradation
xii. Traffic flow disruption and congestion
xiii. Lacking or slow restoration of areas impacted by construction
xiv. Health and safety risks to worker's and the general public
xv. Impacts due to operation of the asphalt plant and campsite

The following impacts were identified to be likely to occur during operational phase of the proposed road projects;

Positive Social Impacts

i. Improved accessibility and connectivity of the project areas
ii. Increased property and land values around the project areas
iii. Increased revenue collection by Ilemela Municipal Council (IMC)
iv. Enhancement of safety and security status of the project areas through the provision of traffic lights, walk ways and road signs
v. Enhancement of aesthetic values of the project areas
vi. Reduction of health risk related to dust dispersion and deposition at the project areas
vii. Risks for increase in road accidents

Positive Environmental Impacts

viii. Improvements in collection of road surface runoffs
ix. Improved green and overall scenary of an area

Negative Environmental Impacts

x. Environmental hazards resulting from waste deposition into storm water drains
xi. Increase in risks for pollution of surface and ground water

Impact assessment and evaluation was done using simple methods (checklists) and procedures (existing structures at local authorities). It is envisaged that the anticipated impacts from development of the infrastructure sub-projects in Ilemela Municipality will be short-term, site specific, confined, reversible and can be managed through the application of a set of mitigation and monitoring measures presented in the Environmental and Social Management Plan (ESMP). The ESMP clearly indicates the institutional responsibilities with regard to

implementing mitigation measures, monitoring of the implementation of these mitigation measures and related cost estimates and time horizons. Some of the proposed mitigation measures are:

- *Soil and Water Pollution Impacts***:** 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.
- *Noise and Air quality pollution:* 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. 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).
- *Community and health and safety:* The road design should take account of safety concerns especially at human habitation crossings e.g., installation of bus stops at settlement centers.
- *Road accidents and other incidences:* 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.
- *Water use permit from the lake:* The contractor shall obtain a water right from Lake Victoria Basin Offices before any abstraction of water in the project area.
- *Pressure on water use:* The amount of water given to the contractor shall consider the local community around the project road and downstream of the water course.
- *Solid waste disposal:* Disposal wastes shall be done in accordance to clause 1713 of the Standard Specifications for Road Works 2000.
- *Protection, use and management of borrow pits*: Borrow Pits and Quarry Sites Operational and Management Plan shall be prepared by the contractor for approval by the TANROADS and the Bank before extraction of the materials. This plan shall form part of tender and bid documents and the contract.

Further, the ESIA has assessed the capacity of the Municipal Council to implement the proposed screening process and mitigation measures. The Council has previous experience with management of environmental and social issues related to construction/ civil works under Mwanza City Council.

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 and TTCL (where necessary) 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. The discharge points shall be carefully chosen to avoid erosion of arable land and creation of gullies.
v. 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.
vi. 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.
vii. 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.
viii. 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.
ix. Appropriate working gear (such as nose, ear mask and clothing) and good camp management shall be provided.
x. The road design shall take account of safety concerns especially at human habitation crossings e.g. installation of bus stops at settlement centres.
xi. 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.
xii. Adequate number of waste bins shall be provided at the constructio sites site
xiii. Close supervision of earthworks shall be observed in order to confine land clearance within the proposed new coridor of impact boundaries.
xiv. 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.
xv. Installation of proper road signs and regular inspections for their presence
xvi. Installation of speed control devices like humps
xvii. 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 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.

ACKNOWLEDGEMENT

Ilemela Municipal Councilwishes to convey heartfelt thanks and appreciation to all stakeholders who in one way or other supported the completion of this work. Special thanks to the ward and mitaa leaders, NEMC, TARURA and community members on the project areas for provision of relevant information and for their prompt assistance during the fieldwork. The proponent would like to thank the 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

The Ilemela Municipal Council (IMC) was established in 2012 after the split of the former Mwanza City Council and it is one of the eight local government authorities of the Mwanza Region. The council has the area of 1080.55 Sq. Kms out of which 828.45 Sq. Kms (77 Percent) are covered by water body (Lake Victoria) and 252.10 Kms (23 Percent) is land. Ilemela lies in the southern shores of Lake Victoria, located between Latitude $2^0$15'and $2^0$3' South of the Equator and Longitude $32^0$45' and - $33^0$2' East of Greenwich (URT, 2017). Administratively, the Council comprises of 19 wards namely: Ilemela, Bugogwa, Sangabuye, Kayenze, Nyamanoro, Kirumba, Kitangiri, Pansiasi, Buswelu, Nyamhongolo, Nyakato, Buzuruga, Mecco, Nyasaka, Shibula, Kahama, Kawekamo, Ibungilo and Kiseke. In the east, it boarders the Magu district, and Mwanza city council in the South while in the North and West, there is Lake Victoria.

1.2 About Tactic Project

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-Improvement of Buswelu - Busenga - Coca Cola Road/Musoma Road at Igoma (3.3 km) and Buswelu-Nyamadoke-Nyamhongolo Road (9.5km).

1.3 Environmental and Social Impact Assessment

This preliminary environmental and social finding covers for the upgrading of Buswelu - Busenga - Coca Cola Road/Musoma Road at Igoma (3.3 km) and Buswelu-Nyamadoke-Nyamhongolo Road (9.5km). The environmental and social study is 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 EIA process, which culminates with an award of the EIA certificate by the Ministry responsible for Environment. The EIA 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

The environmental and social assessment has been conducted in accordance with the guidelines laid down by the Environment Management Act (EMA, 2004). Part IV of the EIA Regulations GN No. 349 7 of 2005 which provides the general objectives for carrying out EIA, among others. The list objectives include the following: -

i. To ensure that environmental considerations are explicitly addressed and incorporated into the development of decision-making process of the project;

ii. To anticipate and avoid, minimize or offset the adverse significant biophysical, social and relevant effects of developmental proposal.

iii. 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 establish 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 Ilemela Municipal 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.

The study has determined the environmental consequences of the proposed project. In undertaking the ESIA study, the consultant collected baseline data on physical, biological and socio-cultural environment of the area. The information used to predict the potential impacts of the proposed activities as well as to develop appropriate mitigation and enhancement

measures and to plan programs to monitor any changes that may result after construction and use of the proposed infrastructure.

1.4.2 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 EIA, the EMA operationalized through the EIA and Audit Regulations of 2005. According to these regulations, the National Environment Management Council (NEMC) manages the EIA 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 EIA study after the project has registered by the proponent. This procedure has followed in the execution of this ESIA study.

1.4.3 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.

1.5 Approach and methodology

1.5.1 Study Team

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

1.5.2 Social Survey

A comprehensive ESIA process carried out employing different methods to meet the requirements as specified in the ToR. The Team reviewed all relevant documents; Secondary data focusing on the socio-economic situation of the potentially affected population were reviewed at all levels. The methodology used for carrying out ESIA study includes the following;

1.5.3 Public and officials Consultations

These conducted through meetings with major stakeholders of the project. During the fieldwork, consultative meetings held with municipal, ward and Vitongoji/Villages / hamlet authorities in the project areas within Ilemela Municipalities. 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.

1.5.4 Observation

This done to identify physical features and socio-economic conditions along the road in order to obtain the existing condition of the proposed routes including vegetation, settlement patterns, land use activities and accessibility to social services.

1.5.5 Documentary review

Relevant documents reviewed to get an overview about the project and to extract useful information required to complement ESIA study. These included guiding national and policies, Municipal reports (profile), etc related and relevant to the study.

1.5.6 Impact Assessment

Impacts identification was done by superimposing the project elements onto the existing social and environmental natural using checklists. An environmental impact matrix method was used to identify 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 measures is summarized in the Environmental and Social Management Plan (ESMP).

The environmental assessment has been undertaken in close interaction with the engineering planning and design team of Dar Al Handasah who are the design consultant. In this process environmental impacts have been evaluated for various alternatives. Several project alternatives were considered including that of not implementing the project. The fundamental environmental protection strategy and environmental considerations influencing engineering design were incorporated. However, reasonable regard to technological feasibility and economic capability were taken into account.

1.5.7 Report Structure

This report is divided into Twelve (12) chapters:

Chapter 1 contains the introduction on the background information of the proposed project, its development objectives, rationale and the proposed project implementation arrangements.
Chapter 2 contains the project description, in which there is a description of the location and relevant components of the project and their activities.
Chapter 3 illustrates policy, legal and administrative framework, which are the relevant Tanzanian environmental policies and legislation applicable to construction projects.
Chapter 4 has the baseline information relevant to environmental characteristics, which gives details concerning the Bio-physical environment and socio-economic environment at the project area.
Chapter 5 express the consultation exercise at the project area detailing the list of stakeholders consulted and the issues raised.
Chapter 6 describes the positive and negative environmental impact of the project that generated from the different phases (the planning and designing, construction, operation and maintenance and the demobilization phases).
Chapter 7 gives the mitigation measure for the potential negative impact of the project.
Chapter 8 presents the Environmental and Social Management Plan (ESMP).
Chapter 9 presents the Environmental Monitoring Plan that contains the proposed institutions to carry out the monitoring activities, the monitoring indicators, period and the proposed budget for monitoring.
Chapter 10 gives the cost benefit analysis of the project.
Chapter 11 provides the decommissioning plan for the proposed project however; the decommissioning not anticipated in the near future.
Chapter 12 gives the summary and conclusions of the study.

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 EIA 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 upgrading of Buswelu – Busenga – Coca Cola Road/ Musoma Road at Igoma (3.3 km) and Buswelu-Nyamadoke-Nyamhongolo Road (9.5km).

2.2 Rationale for the project

The project will assist the community along the project and nearby community to interact easily to the CBD 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.

2.3 Project description

2.3.1 Project Location

The project area is located in Ilemela Municipality, which is one of the seven districts of the Mwanza Region of Tanzania. Mwanza City, is a port city and capital of Mwanza Region on the southern shore of Lake Victoria in north-western Tanzania. 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. Mwanza region is one of Tanzania's 31 administrative regions. Mwanza region is part and parcel of Tanzania Mainland’s Lake zone, which comprises of the regions of Mara, Geita and Kagera (**Figure 2.1**). The neighboring regions are Geita to the west, Shinyanga to the south, and Simiyu to the east. Furthermore, Lake Victoria borders the region's north frontier.

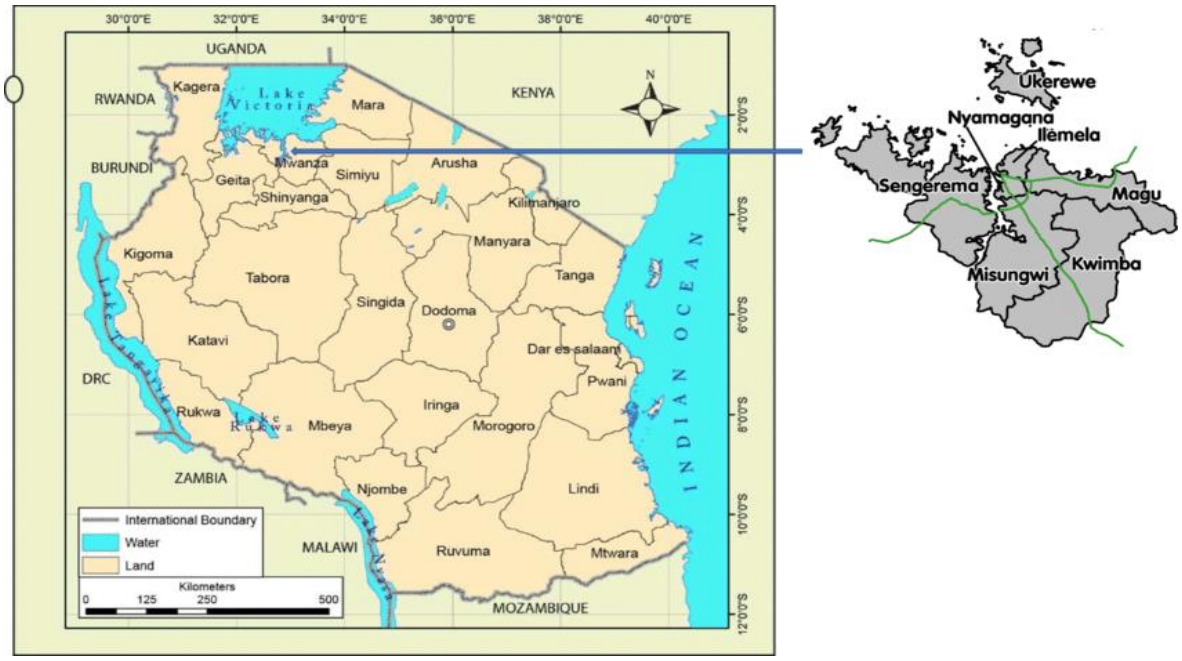

Figure 2.1: Map of Tanzania showing the Mwanza region (Source: Tanzania Atlas, 2014)

2.3.2 Location and Site Environment

The IMC is envisaging to upgrade Buswelu – Busenga – Coca Cola Road/ Musoma Road at Igoma (3.3km) and Buswelu – Nyamadoke – Nyamhongolo Road (9.5km) which pass through Nyamhongolo and Buswelu wards. These wards are strategically located and a focal point for business activities in Ilemela Municipal and Mwanza Region in general (**Figure 2.2**) therefore connecting them will improve the livelihood of the areas.

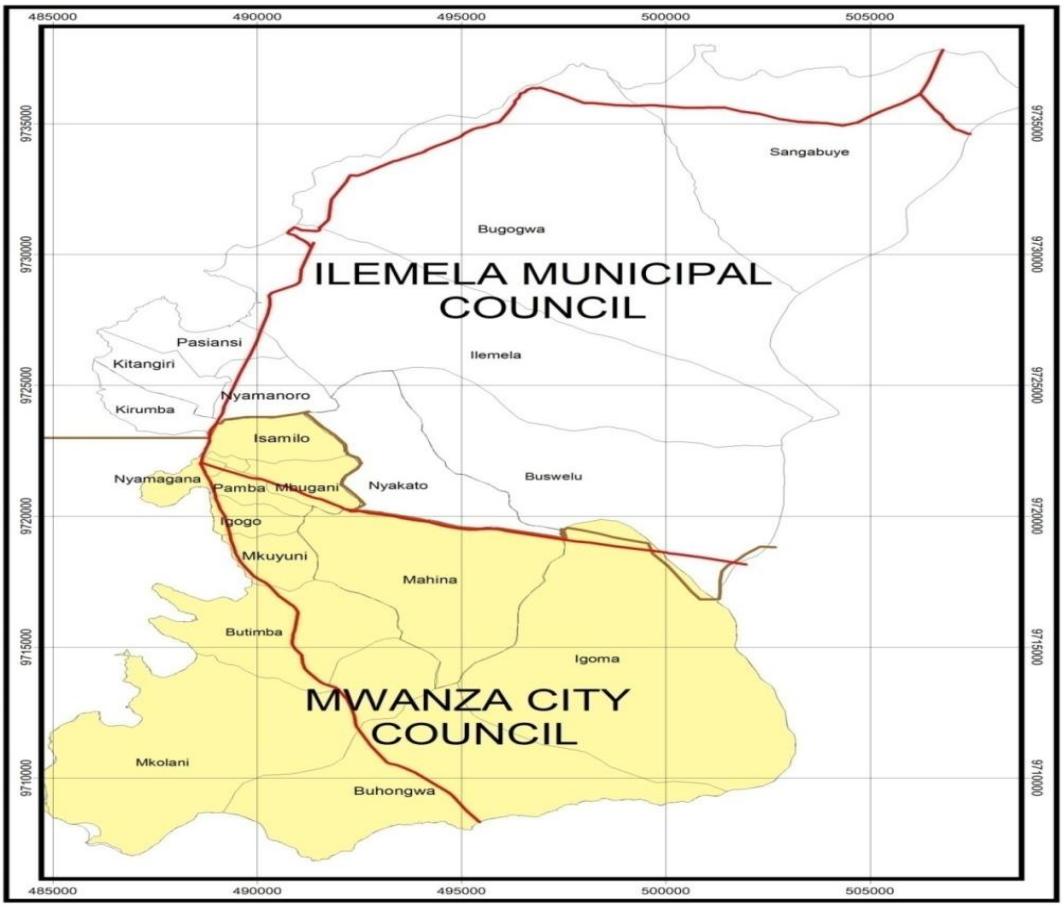

Figure 2.2: Map showing the location of Mwanza City Council and Ilemela Municipal Council (Source: IMC, 2021).

2.4 Project Components and Design

2.4.1 Project Components

The upgrading of Buswelu - Busenga - Coca Cola Road/Musoma Road at Igoma (3.3 km) **(Figure 2.3 and 2.4)** and Buswelu – Nyamadoke – Nyamhongolo Road (9.5km) (**Figure 2.5 and 2.6)** is important because the road connects the Buswelu to Igoma (Coca Cola Road/Musoma Road), critical in terms of economic impact and urban development while the later connects the Tanzania Strategic Cities Projects – Additional Financing 2 (TSCP – AF2) roads which connect with Musoma road, access to the newly constructed Ilemela bus terminal, serves significant number of communities and ease traffic. According to the Ilemela MC master plan, the RoW for Buswelu – Nyamadoke – Nyamhongolo Road is 50m i.e., 25m each side from center line of the road. The proposed upgrading will cover a distance of 9.5km. The proposed roads to be constructed are near sensitive areas which are mostly human settlements, businesses, farms, graves as well as utilities such as TANESCO poles and water supply pipes which may be affected during project implementation.

2.4.2 Existing conditions of the right of way

The proposed roads will be constructed on the existing roads corridor that is owned by the government. The road is located in the planned areas with RoW which is large enough to accommodate the proposed road though, there are few houses, businesses, graves, MWAUWASA water supply pipe and TANESCO transmission line that are located within the RoW which will need to be relocated and compensated. The surveys done during the

Resettlement Action Plan (RAP) and Valuation (**Appendix IV**) revealed that there are 82 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.

Currently, there is the 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.

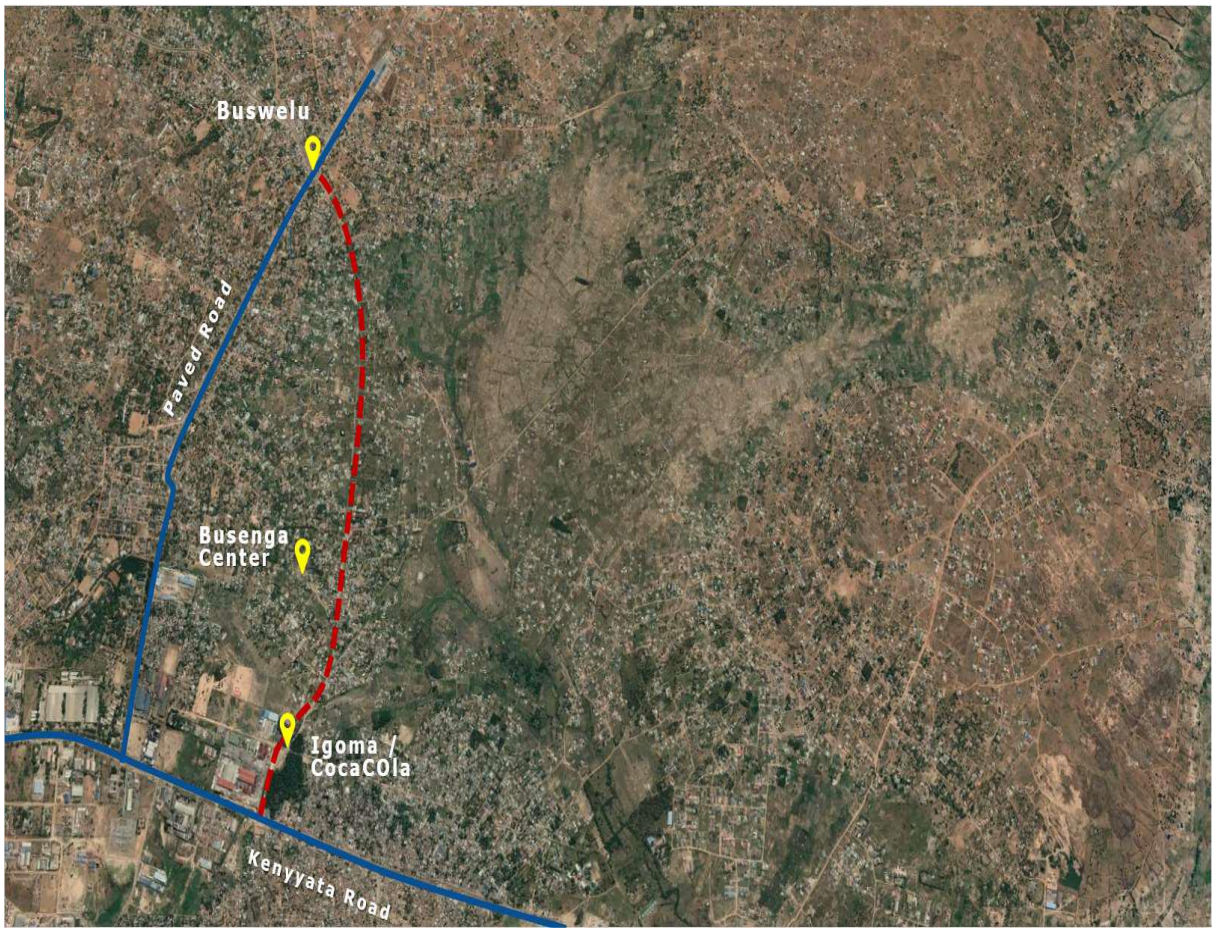

Figure 2.3: The proposed Buswelu – Coca Cola - Busenga road (Source: Consultant, January 2022)

Figure 2.4**:** The proposed Buswelu – Coca Cola - Busenga road-existing conditions (Source: Consultant, January 2022)

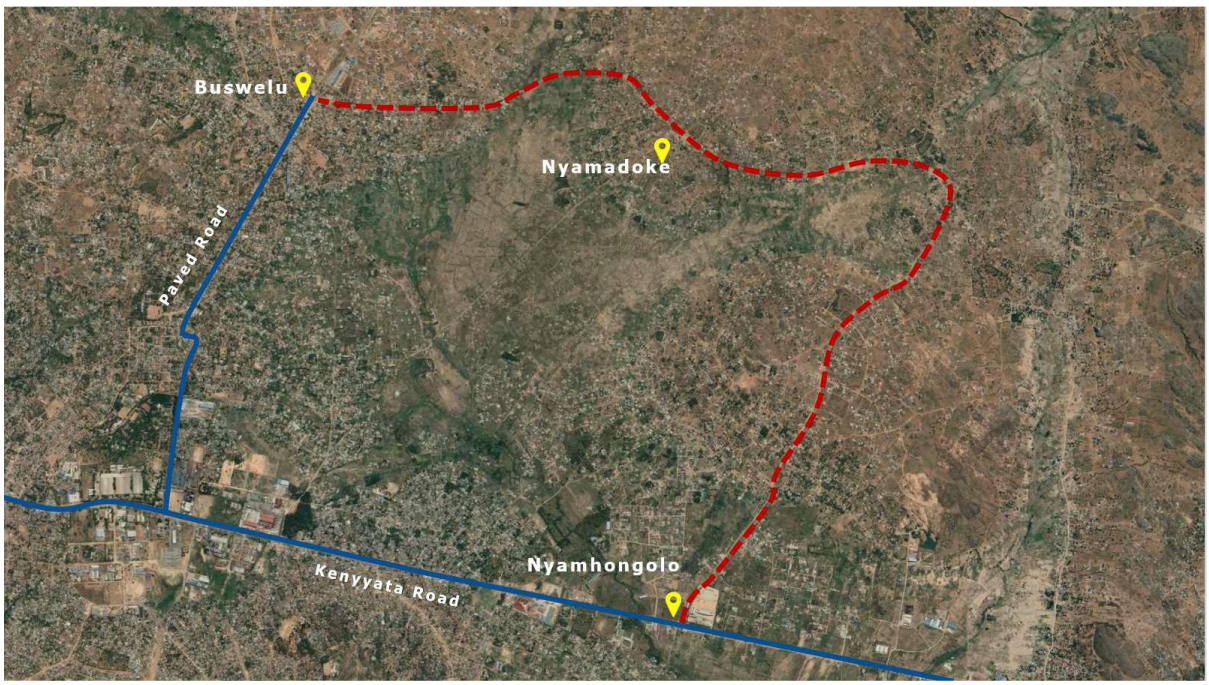

Figure 2.5**:** Proposed Buswelu-Nyamadoke-Nyamhongolo road (Source: Consultant, January 2022)

Figure 2.6**:** Proposed Buswelu-Nyamadoke-Nyamhongolo road's existing condition (Source: Consultant, January 2022)

2.4.5 Project Design

To overcome the long-time existing problem of the poor roads and drainages in Ilemela Municipal Council, the municipality is planning to construct the total of 12.8km of roads in a tarmac standard which includes the upgrading of Buswelu – Busenga – Coca Cola Road/Musoma Road at Igoma (3.3 km) **(Figure 2.7)** and Buswelu – Nyamadoke – Nyamhongolo Road (9.5km) (**Figure 2.8**). The roads will have the following features:

- Storm water drainage
- Culverts
- Traffic and Street lights
- Road marking and road signs
- A road parking slots and Bus bays.

Proposed designs for Buswelu - Busenga - Coca Cola Road/Musoma Road at Igoma (3.3 km) is as indicated in **Figure 2.5** and Buswelu-Nyamadoke-Nyamhongolo Road (9.5km) indicated in **Figure 2.6**.

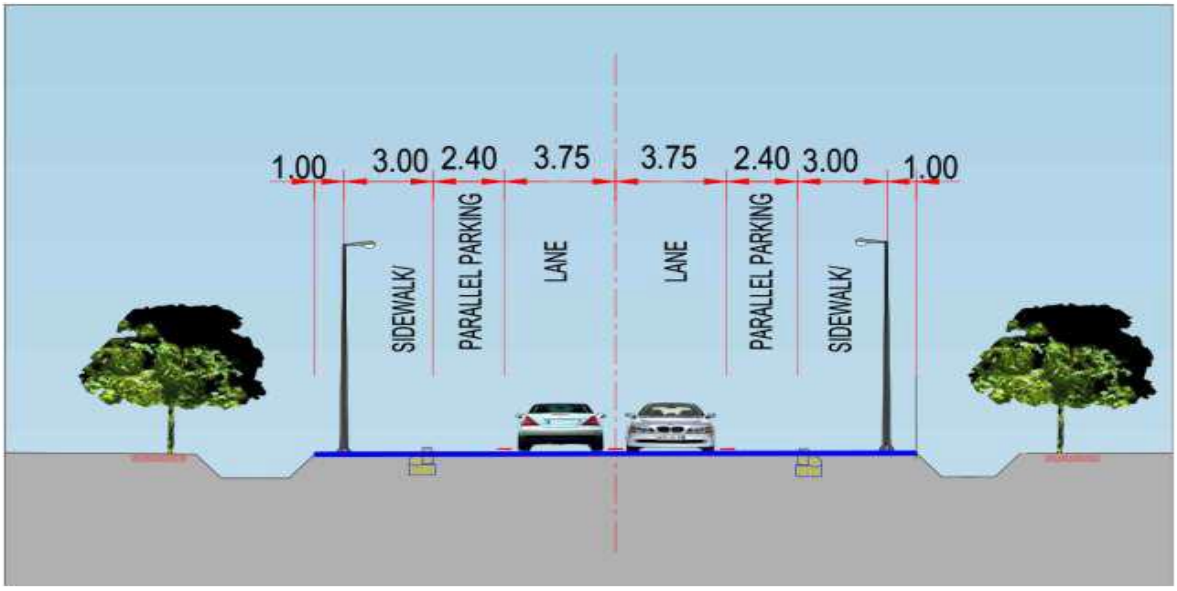

Figure 2.7**:** Proposed design for Buswelu - Busenga - Coca Cola Road/Musoma Road at Igoma (3.3 km) (Source: Consultant, January 2022)

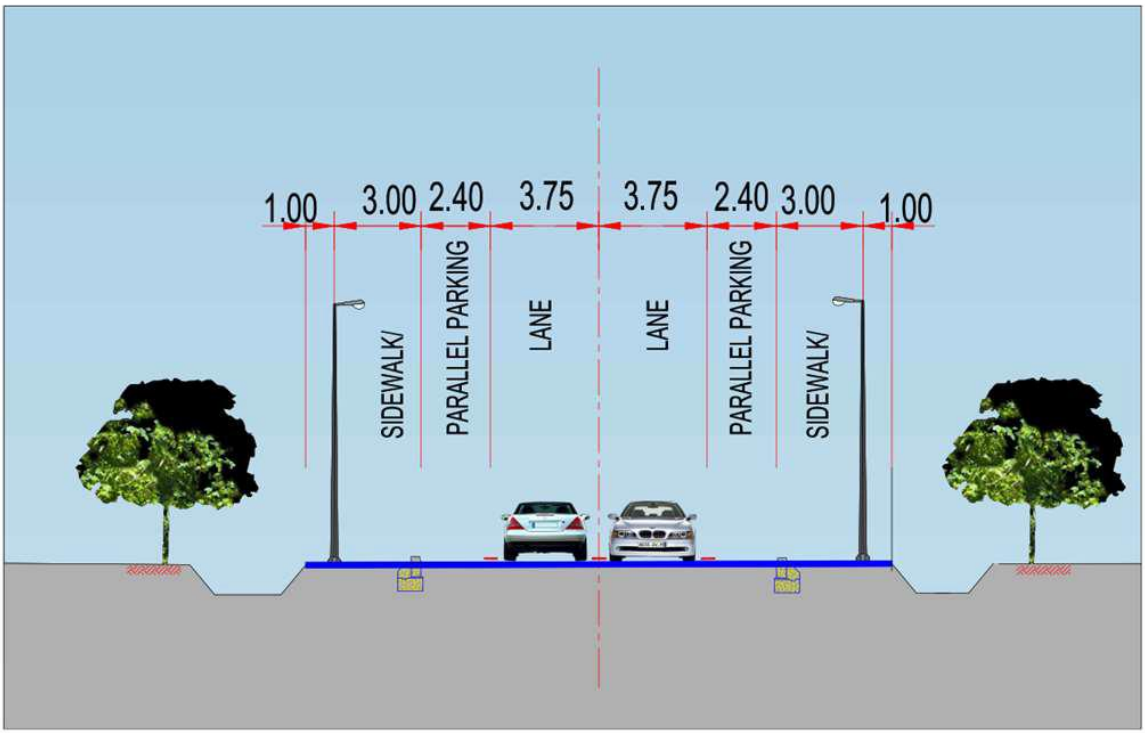

Figure 2.8**:** Proposed design for Buswelu-Nyamadoke-Nyamhongolo Road (9.5km) (Source: Consultant, January 2022)

2.4.6 Project expected outputs

Ilemela Municipal Council has grown by accretion leading to uneven densities. It has negatively affected the city's urban infrastructure and public facilities provision to great extent. This has resulted to inadequate and poor infrastructure services and poor conditions of drainage systems. The overall objective of this project is to improve the livelihood of people by improving drainage system infrastructures that will contribute to the improvement of the safety and wellbeing of the people.

2.5 Project Activities

2.5.1 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. The following are the main activities to be executed on the site during Pre- construction phase;

- **Topographical Survey**- Done by Surveyors to establish the boundaries and the ground levels.
- **Hydrology and Hudraulic study**- Done by hydrologists to determine determining design peak flood discharges across project roads. These peak floods will be the basis for the designs of the hydraulic structures with the required capacities (**Appendix VII**).
- **Geotechnical investigations**- done by the geotechnical engineers to determine the physical properties of rock and soil around the site (**Appendix VIII**) .
- **Architectural and Services Designs**- Preparation of Architectural drawings was done by Dar Al Handasah in joint venture with Don Consult Ltd architects to provide drawings which fits the Clients' requirements. Architectural Drawings provided in section 2.4.
- **Environmental Impact Assessment** (EIA)- This ESIA report part of the EIA for the project. It has been prepared according to EIA and Audit regulations of 2005 as amended in 2018.
- **Acquisition of various permits/ certificates** - Including building permit from relevant authorities.

The proposed project will have a total of 200 workers who will be skilled and non-skilled labor.

Duration

The duration of this phase will be Four (4) months.

Types and Sources of Project requirements

Types and sources of project requirements during the pre-construction phase are shown in **Table 2.1.**

Table 2:1**:** Types and sources of project requirements during the pre-construction phase

Requirements	Type	Source	Quantity (Approx)
Raw Materials	Gravel	Kisesa and Kwa Mansoor Commercial Quarries	7,800 - 10,000 tons
	Hard Stone	Mkolani Borrow Pit	30 – 35 tons
	Sand	Airport and Mkolani commercial sand pits	55 tons
	Water	Lake Victoria/ MWAUWASA	65,000 litres
	Cement	Commercial stores in Ilemela Municipality	3 tons
	Reinforcement bars	Commercial stores in Ilemela Municipality	9 tons
	Timber	Local vendors	1 ton
Energy	Electricity	TANESCO (National Grid)/ Generators	220 kV
	Fuel	Local vending stations	
Manpower	Skilled	Contractor	100

Requirements	Type	Source	Quantity (Approx)
	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 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 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 2.2**.

Table 2:2**:** Types, amounts and treatment/disposal of wastes during the pre-construction phase

Waste	Types	Amount	Treatment/ Disposal
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^3 (Based on 200 people, 40l/capita/day water consumption and 80% becomes wastewater)	Septic tank –Soakaway system at the campsites/ office
	Oils and greases	Non	Car maintenance will be done at proper garages

(**Source:** consultant's analysis, 2022)

2.5.2 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 one (1) year.

Types and Sources of Project requirements

Types, amounts and sources of project requirements during the construction phase are shown in **Table 2.3.**

Table 2:3**:** Types and sources of project requirements during the construction phase

Requirements	**Type**	**Source**	**Quantity (Approx.)**
Raw Materials	Gravel	Kisesa and kwa Mansoor Commercial Quarries	50,000 – 55,000 tons
	Hard Stone	Mkolani Borrow Pit	130 tons
	Sand	Airport and Mkolani commercial sand pits	250 – 270 tons
	Water	Lake Victoria/ MWAUWASA	500,000 litres
	Bitumen	Contractors Asphalt plant	2,800 tons
	Cement	Commercial stores in Il	10,000 tons
	Reinforcement bars	Commercial stores in Mwanza	80 tons
	Timber	Local vendors	1 ton
Energy	Electricity	TANESCO (National Grid)/ Generators	220kV
	Fuel	Local vending stations	
Manpower	Skilled	Contractor	25
	Unskilled	Local People along the road	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
	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)

Table 2.3 is also in tandem with the Environmental and Social Standard (ESS) 2 on Labour and working conditions. A number of project workers, both skilled and unskilled 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.

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[1] 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.

Transportation

Materials (fine and coarse 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 bunded areas.

Types, Amounts and treatment/disposal of Wastes

Types, amounts and treatment/disposal of wastes during the construction phase are shown in **Table 2.4.**

Table 2:4**:** Types, amounts and treatment/disposal of wastes during the construction phase

Waste	Types	Amount	Treatment/ Disposal
Solid Waste (Degradable)	Vegetations (Trees, Grasses) and remnants of timber.	300m^3 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^3 (Based on removal of 10cm topsoil from the (5x12)m^2 area on	Backfilling material in the borrow pits, fill the diversions.

[1] 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.

		both sides of the roads	
	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^3/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	Non	Car maintenance will be done at proper garages

(**Source:** consultant's analysis, 2022)

2.5.3 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 five (5) months.

Types and Sources of Project requirements

Types, amounts and sources of project requirements during the demobilization phase are shown in **Table 2.5.**

Table 2:5**:** Types and sources of project requirements during the demobilization phase

Requirements	**Type**	**Source**	**Quantity**
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.

2.5.4 Operation phase

The actual usage of the roads is expected to commence after completion of the construction works. Management of the roads shall be under the Municipal Works Engineer. During the operational phase, the Ilemela Municipal council shall be responsible for routine maintenance of the roads including resurfacing of the (as may be needed), removal of debris from storm water channels and clearance of vegetation along the road. The following activities will be performed during the operation phase:

Activities during operation of roads and drains

- Periodic maintanace of of the roads and storm water drains
- Removal of debris and silt from the trenches
- Sweeping and removal of dirt from the roads

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 2.6**.

Table 2:6: Types and sources of project requirements during the operational phase (Maintenance)

Requirements	Type	Source	Quantity
Raw Materials	Gravel	Kisesa and kwa Mansoor Commercial Quarries	5,000 tons
	Hard Stone	Mkolani Borrow Pit	15 tons
	Sand	Airport and Mkolani commercial sand pits	300 tons
	Water	MWAUWASA	100,000 litres
	Asphalt	Contractors Apshalt plant	4,500 tons
	Cement	Commercial stores in Mwanza	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 Compactor	Contractor	1
	Plate compactor	Contractor	1
	Crasher	Contractor	1
	Tippers	Contractor	1

(**Source:** consultant's analysis, 2022)

Types, Amounts and management of waste
Types, amounts and treatment/disposal of wastes exepected to be generated during the operational phase are mainly waste/debris disludged from storm drains during regular O&M of the drains, and paper wastes from the ticketing station to be constructed at the bus parking stands. These are shown in **Table 2.7**.

Table 2:7: Types, amounts and management of wastes produced during the operational phase

Waste	Types	Amount	Treatment/ Disposal
Solid Waste (Degradable)	Vegetations (Trees and Grasses)	$5m^3$/ 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)

2.5.6 Decommissioning

Decommissioning at the end of its life or rehabilitation or up-grading an infrastructure or its component may involve demolition of structures and site restoration. Depending on the design, standard decommissioning for this asphalt road is after 20 years where the road undergoes major rehabilitation and resurfacing.

Types and sources of project requirements
Types and sources of project requirements during the demobilization phaseareshown in **Table 2.8**.

Table 2:8: Project requirements during the demobilization phase

Requirements	Type	Source	Quantity
Manpower	Skilled	Contractor	10
	Unskilled	Local People along the road corridor	25
Equipment	Bull dozer	Contractor	1
	Motor grader	Contractor	1
	Roller Compactor	Contractor	1
	Plate compactor	Contractor	3
	Tippers	Contractor	1

(**Source:** consultant's analysis, 2022)

2.6 Construction Materials and Labour Force

Essential construction materials include gravel, stone aggregates, sand, iron bars, water and bitumen. All natural materials are available in the project area (in the region) while other are commercially available elsewhere (**Figure 2.9**).

Figure 2.9**:** Left: Nyanza Commercial Quarry. Right: Mkolani Borrow Pit (**Source:** Ilemela road report 2017).

Construction works are generally labour intensive. Apart from technical and skilled manpower, recruitment of unskilled labour will be done locally. A minimum of 120 people are expected to be employed by the 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 Labolatories 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.

2.7 Camp Site Location

The location of the campsite(s) has not been identified. The developer shall discuss with the contractor on proper location of the camp site, in agreement with the local community. Due to the nature of the project sites, it is possible that the project will rent accommodation for skilled labour may be sourced out of Mwanza. Local labourer will return to their homes at the end of working hours. If it turns out that the remaining subprojects need a campsite, the contractor shall rent land from the community. The developer will make sure that all legal issues are considered in order to have mutual benefits.

2.8 Waste Generation

Waste generated during all the project phases shall be handled in an environmentally friendly manner. Spoil soil shall be stock piled along the road alignment or at the borrow pits. The soils shall be used to reinstatement of sites at the end of the project implementation phase. Domestic wastes generated at the campsites and offices shall be disposed in VIP latrines connected to septic tank/soak away systems. Solid wastes shall be stored in waste bins at the sites/campsite, and later transported to designated disposal sites. Other contingent plans to handle the accidental oil spillages and general waste management shall be worked out during the preparation of the Environmental and Social Management Plan (ESMP).

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, programmes, 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, 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 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 Ilemela Municipal 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: 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 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.

3.1.6 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.

3.1.7 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.

3.1.8 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.

3.1.9 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 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 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 is 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.

3.1.11 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.

3.1.12 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 areas 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.

3.1.13 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 road construction in Ilemela MC is likely to stimulate growth and spread of SMEs, that may be engaged in a variety of activities, including service provision and employment opportunities.

3.1.14 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: 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. Good governance and the rule of law moral and cultural uprightness, adherence to the rule of law, elimination of corruption. 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 Environmental Management Act No. 20 of (2004), Cap. 191

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 (EIA) and other Assessments and directs that an EIA 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 EIA 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'*. Ilemela Municipal 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 employers. 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

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. 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. PO-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. The proponent shall ensure that this Act is abode to by providing the workers of the proposed project with compensation accordingly.

3.2.9 The Tanzania Extractive Industries (Transparency and Accountability) Act (2015)

These Regulations may be cited as the Tanzania Extractive Industries (Transparency and Accountability) Act, 2015. It provided that every extractive industry company shall keep records of payments, beneficial ownerships information, costs of production, exploration, prospecting, award or transfer of licenses, capital expenditure at every stage of investment, volumes of production.

The contractor shall ensure that all extractive companies providing construction materials such as rocks, gravels and sand which shall be used in the project are have proper licenses and operate under this act.

3.2.10 The Investment Act (1997) Cap 38

This legislation governs investment activities related to, among other things, the conservation and management of land and natural (environmental) resources. Foreigners who want to invest on land in Tanzania must route their applications for allocation of land to the Tanzania Investment Centre (TIC). The TIC would issue land to successful applicants.

The derivative right of occupancy for purposes of investment is issued under section 20(2) of the Land Act. The law requires that a survey of land be carried out prior to granting a right of occupancy. For land that is intended for investment purposes, the process originates at the Ministry level, in the Directorate of Surveys and Mapping. Depending on the use to which the land is to be put, there must be consultation with the relevant Ministry. Local communities must be involved where land is under Customary Law.

The proposed project is an investment by the government which will facilitate other development activities. Measures to comply with this Act will be implemented as appropriate.

3.2.11 The Income Tax Act R.E 2019

An Act to consolidate provisions relating to tax administration with a view to easing the administration of tax and enforcement of tax laws by the Tanzania Revenue Authority; to introduce currency point system in tax administration; and to provide matters incidental thereto.

For resident employees with one employment the amount of tax to be withheld from employment income is based on the total income from employment for the year. The tax rates for individuals as per Paragraph 1 (1) of the First Schedule to this act are applied to calculate the tax to be paid for the year with respect to the employment (the "annual tax liability"). The annual income is divided evenly over the twelve months period and the amount (PAYE) that should be withheld from the employee's taxable payments for each month is established. PAYE stands for Pay-As-You-Earn and it can be defined as a withholding tax on taxable incomes of employees. Under this system, an employer is required by law to deduct income tax from an employee's taxable salary or wages.

The proponent shall comply with this Act and ensure to abide with PAYE throughout the project phases.

3.2.12 The Village Land Act Cap 114 R E 2019

The Village Land Act 1999 ensures that there is an established independent, expeditious and just system for adjuration of land disputes which will hear and determine land disputes without undue delay and will recognize that all lands in Tanzania are public lands vested in the President as trustee on behalf of all the citizens. This law regulates the amount of land that any one person or a corporate body may occupy or use and ensures that land is used productively and in compliance with the principles of sustainable development. The project will ensure that it will be implemented in compliance with the principles of sustainable development. The proposed project shall be implemented on land that has been legally acquired by the project proponent by complying with conditions of occupancy of the subject land.

3.2.13 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.

3.2.14 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 Ilemela Municipal 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.

3.2.15 Environmental Impact Assessment and Auditing Regulations (2005)

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

3.2.16 The Environmental (Registration 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.

The proponent has ensured that the environmental experts are involved in this project are registered and conduct the environmental impact assessments in accordance to this regulation.

3.2.17 The Urban Planning (Planning Space Standards) Regulations, 2018

The Urban Space Standards Regulations of 2018 includes standards for residential areas, unplanned settlements, building lines and setbacks, plot coverage and plot ratio, health facilities, education facilities, recreation facilities, beach facilities, golf courses, passive and active recreation, public facilities by planning levels, public facilities by population size, parking and road width, and agricultural show grounds.

The project Architects have complied with the Regulations in considerations of the urban planning space standards.

3.2.18 The Environmental Management (Fee and charges) Regulations, 2021

These Regulations shall apply in relation to an act or service in respect of which fees and charges are payable under the Act and Regulations made thereunder. The major reasons for this amendment are to make all registered consultants and proponents responsible for what they are working for and sensitize on the environmental management practices. Fees and Charges have been categorized in the following components whose charges in each are well described in the Schedule provided for each project category and sector:

1. Fees and charges for environmental impact assessment;
2. Environmental experts' registration fees;
3. Environmental compliance monitoring and audit (Annual fees for Environmental Monitoring and Audit);
4. Fees for environmental quality standards;
5. Fees for ozone depleting substances;
6. Fees for hazardous waste permits;
7. Fees for electrical and electronic equipment waste permits;
8. Fees for health care wastes;
9. Fees for solid waste permits;
10. Fees for biosafety permits;
11. Fees for noise permits;
12. Fees for vibration permits; and
13. Other permits.

The project activities are subject to environmental fees and charges. The Developer has paid an Application for EIA TZS 50,000 and Submission of Project Brief/Scoping Report TZS 150,000. Section 14 of the Regulations prescribes fees for Environmental compliance monitoring and audit (Annual fees for Environmental Monitoring and Audit for Building and Civil engineering industries and for the case of this project it is TZS 50,000 which the Developer will pay.

3.2.19 The Environmental Management (Hazardous Waste Control and Management) Regulations, 2021

These regulations shall apply to all categories of hazardous waste and to the storage and disposal of hazardous waste and their movement into and out of Mainland Tanzania.

Section 6 of these Regulations states Right and duty to safeguard the environment from adverse effects of hazardous waste. It states that

(1) Every person living in Tanzania shall: -

(a) have a right to clean, safe and healthy environment; and

(b) have a stake and a duty to safeguard the environment from adverse effects of hazardous wastes and to inform the relevant authority on any activity or phenomenon resulting from hazardous waste that is likely to adversely affect the environment and human health.

(2) A generator of hazardous waste shall be responsible for the sound management and disposal of such waste and shall be liable for damage to the environment and injury to human health arising thereby.

Section 16 prescribes the application for permit to manage hazardous waste. Also, section 24 Permit for collection of hazardous waste.

The project will generate little amount of hazardous waste during construction and operation. The project will employ contractors for collection of such wastes who have all necessary waste licenses and authorizations, and comply with conditions thereof. 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.

3.2.20 The 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 Ms. Rosemary Nyirenda a registered Environmental Expert 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.

3.2.21 The Environment Management (Prohibition of Plastic Carrier Bags and Plastic Bottle Cap Seals) Regulations, 2022

The Environment Management (Prohibition of Plastic Carrier Bags and Plastic Bottle Cap Seals) Regulations of 2022 shall apply to (a) the import, export, manufacturing, sale, supply, storage and use of plastic carrier bags within Mainland Tanzania; and (b) the import, export, manufacturing, sale and use beverages with plastic bottle cap seal. The objectives of these Regulations are to: (a) impose a total ban on the import, export, manufacturing, sell or offer for sale and use of plastic carrier bags regardless of their thickness; (b) impose a total ban on the import, export, manufacturing, sale and use beverages with plastic bottle cap seal; (c) protect human and animal health as well as the environment from likely adverse effects of utilization of plastic carrier bags, or plastic bottle cap seals; and (d) provide economic and financial incentives for the production and importation of alternative carrier bags. Part III Section 5 (Prohibition of plastic carrier bags) states that "All plastic carrier bags, regardless of their thickness are prohibited from being imported, exported, manufactured, sold, stored, supplied and used in Mainland Tanzania" and Section 6 (Prohibition of plastic bottle cap seals) states that a person shall not import, export, manufacture, store, distribute, supply, sell or offer for sale beverages with plastic bottle cap seals.

Part IV Section 10 (Exemption of plastic packaging) states that without prejudice to the provisions of regulation (5), plastic or plastic packaging for medical services or industrial products or construction industry or agricultural sector or food processing or sanitary and waste management are exempted from the prohibition. Section 11 (Management of waste exempted

plastic packaging) provided that any person who imports, exports, manufactures, sells, stores, distributes, supplies, possesses or uses plastic packaging exempted under these Regulations shall ensure that the waste exempted plastic packaging are managed and disposed of in accordance with the Environmental Management (Solid Waste Management) Regulations, 2009 and the Environmental Management (Hazardous Waste Control and Management) Regulations, 2021.

The proponent shall see to it that the contractor for the proposed project ensures all the plastic waste materials are well managed i.e., that is collected, stored and disposed of properly in accordance to the NEMC guidelines.

3.2.22 The Environmental Management (standards for the control of noise and vibration pollution) Regulations, 2014

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 7which 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.

3.2.23 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 (EIAs) the technical aspects discussed in this Code because these aspects can be directly applied by the road engineers in the conception/planning phase. The EIA 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 (TARURA), Local Government Authorities (District Councils) under the Prime Minister'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.

3.2.24 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 EIA process as briefly explained in **Table 3.1**.

Table 3:1**:** EIA procedures in the road sector (as per EAMGRS 2011)

Administrative Procedures: EIA 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 EIA 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). **Environment Application and Screening Process:** 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 (EIA). 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 the project traverses 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 (lEE) or a Limited Environmental Analysis (LEA). Projects with major environmental impacts are subject to EIA. The RS-ES will register non-major-impact-projects. For major-impact-projects, the registration is done by NEMC.

3.2.25 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 Archeological Data
- 1711 Pesticides, Toxic Waste and Hazardous Substances
- 1712Clean 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.

3.2.26 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.

3.2.27 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.

3.3 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 industrialized 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 industrialized 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

3.5.1 World Bank Environmental and Social Standards

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 (EHSGs). 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 3.2.**

Table 3:2: 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 ESIAs 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	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. 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[2] regarding the COVID-19 situation in relation to stakeholder consultations, project worksites and related areas.

[2] 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
ESS 3: Resource Efficiency and Pollution Prevention and Management	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 ESIAs, ESMPs and WMP. More or less similar 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	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. Implementation of the Project is likely to trigger influx of workers or job seekers and their followers into a sub-project area. 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. 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[3] regarding the COVID-19 situation in relation to stakeholder consultations, project worksites, communities and related areas.
ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Yes	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. 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.

[3] 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
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Yes	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. 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.
ESS 7: Indigenous People/Sub-Saharan African Historically Underserved Traditional Local Communities	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 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 Ilemela Municipal 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 ESIAs/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.

3.4.3 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 3.3**).

Table 3:3**:** World Bank EHS Guidelines applicable

EHS Guideline	Content & Relevance to Roads Construction in Ilemela
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 roads in Ilemela Municipality. 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[4];***

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[5].

Among the applicable guidance notes for HEET 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:

-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;

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

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

-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 EIA 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 EIA and may also delegate the power of approval for an EIA to the DoE, Local Government Authorities or Sector Ministries. The Minister also:

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

Relevance: Shall issue certificate for this EIA.

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 EIA 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 EIA’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 EIA in Tanzania:

-Registers experts and firms authorized to conduct EIA;
-Registers projects subject to EIA;
-Determines the scope of the EIA;
-Set-ups cross-sectoral TAC to advise on EIA reviews;
-Requests additional information to complete the EIA review;
-Assesses and comments on EIA, 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 (ESMP);
-Makes recommendations on whether to revoke EIA Certificates in case of non-compliance;
-Promotes public environmental awareness;
-Conducts Environmental Audits

Relevance: Register and oversee the whole process of this EIA; Controls the implementation of the Environmental Management Plan (ESMP) 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 EIA'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 district 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 Ilemela Municipal Council, all Environmental issues handled by the Municipal 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;
- Advice 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 EIAs 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.

In IMC there are 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

BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

4.1 Biophysical environment and ethnicity

4.1.1 Climate

Ilemela experiences tropical climate which is mainly influenced by the wind patterns from Lake Victoria. The annual temperature ranges between 20^{o}C and 30^{o}C with annual precipitation ranging between 700mm and 1000mm. It receives two rainy seasons: short rains begin in August – October while long season spans from December to May each year. Due to its urban nature and human pressure, vegetation in IMC is highly disturbed and fragmented. Few and isolated protected natural forest patches are found in some hilly areas of Buhogwa, Ilemela, Sangabuye and Kitangiri wards. The Council has 396.8 hectares of forest which constitutes 1.6 percent of total landmass. The forest area is managed through community-based forest management (CBFN) approach. 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.

4.1.2 Topography and Soil

Ilemela Municipality lies at an altitude of 1,140m above sea level. It partly has granites and grandiosity cover and gently undulating to level Physiographic with isolated hill masses and rock inselbergs. It is also characterised by well-drained sandy loamy soil generated from coarse grained cretaceous. The soil drains smoothly and is not saline. The soil ranges from yellow, red, gritty, sandy soils and loam that are delivered from course-grained cetaceans' rock. The soils are usually associated with Island of between 1100 – 1600 meters in height. The natural vegetation consists of isolated trees scattered on grassy hills. Project area is relatively flat. Observation shows that the nature of the top soil is red clay. The proposed roads are designed and shall be constructed by considering the topography and nature of the soil in the project areas.

4.2 Social Services

4.2.1 Ethnicity

Due to intermarriages in the last two decades, acculturation has taken place with merging culture and beliefs. The outcome of this process is that ratio distinctions have been broken and culture has been blended into different types of beliefs and customs. Few tribes still follow their respective customary beliefs diligently. Moreover, it seemed that, the main ethnic group found in the project areas are the Sukuma whom are the dominant tribe found in the whole region.

4.2.2 Gender aspects

As it is with most of the regions in the country, the number of women in Ilemela out numbers that of men. According to the 2012 Census women in Ilemela constitute 51.9 percent of the municipal's total population. Women development efforts have been made by both women and civil societies to make sure that women are engaged in economic activities to create basis for them to enter the mainstream of economic activities in the future. There are 128 women groups in Ilemela Municipal Council dealing with income generation activities such as agriculture,

fish mongering, livestock keeping, "Mama Lishe" (food vendors), and restaurants. Other groups are engaged in savings and credit. The proponent shall ensure that employment opportunity during the project implementation considers gender equality in that both women and men equally participate in the project.

4.2.3 Population, Income and Social Economic Activities

The National Population Census (2012) indicates that the IMC had a total Population of 343,001 people (164,718 males and 178283 females). Given its urban nature, the Council is inhabited by diverse ethnic groups, mainly Sukuma, Zinza, Kerewe, Kurya, Jita and Kara. People in Ilemela engage in various economic activities including: agriculture, livestock keeping, fishing, and beekeeping. IMC is also regarded as among the main suppliers of horticultural crops; greenhouse farming activities are also practiced in its outskirts.

The Council hosts significant number of industries. In 2015, Mwanza had 2,420 small-scale industries of which 23.9 percent were in IMC. These industries include fish processing, marine vessel manufacturing, steel, textiles, soft drinks, mineral processing, plastics, breweries, mining activities (precious metals, aggregate and quarrying extractive), meat processing, cotton ginneries, flour milling, dairy products, rice milling, and brick making industries. To promote industry activities, the Council has earmarked Industrial parks at Ihalalo (260 ha) and some 72.768 ha at Nyamhongolo Plot 559, Block A.

Despite the fact that people in Ilemela conducts multitude of activities, commerce and trade (formal and informal) is the main economic sector which contributes to around 41% of the GDP (**Figure 4.1)** (URT, Undated).

The proposed roads will be of great importance to the community hence will lead to increased income due to increased economic activities and also result to population increase in different areas of Ilemela MC. Increased population may affect the community positively and negatively in that it will facilitate economic activities while it can also result to transmission of STIs and STDs respectively.

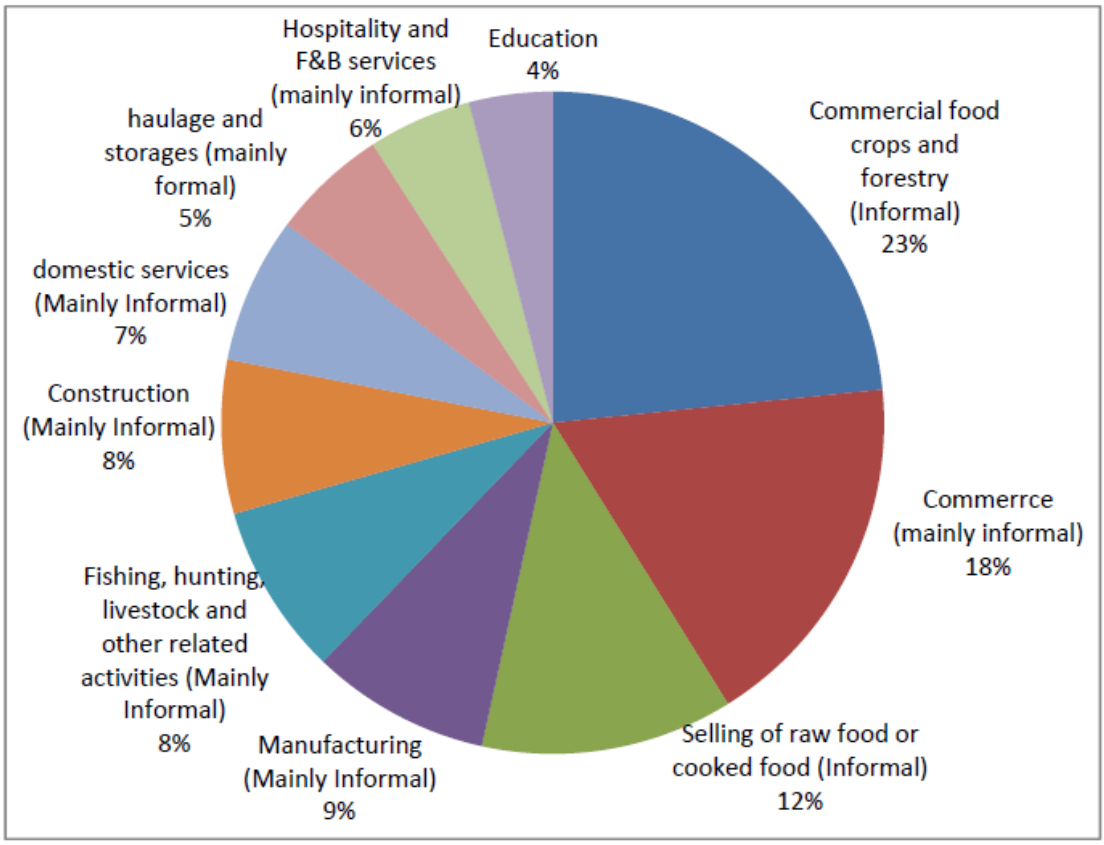

Figure 4.1: Sectors Contribution to Ilemela Municipal Council's GDP (Source: IMC)

4.2.4 Education, Market, and Health Services

The IMC has several social services which support its population to attain standard of living. It has about 115 pre-primary and primary schools and 91 secondary schools. It has one (1) hospital, eight (8) health centers and (nineteen) (19) dispensaries. The council has twelve (12) formal markets including Buzuruga, Nyakato NHC, Kamwanga, Kirumba, Sokoni, Kirumba Mwaloni, Kitangiri, Nyamanoro, Nyasaka Center, Nyasaka Katavi, Kitoleni, Pasiansi, Market, Msuka, and Sabasaba and Nafaka. Majority of them are congested and their infrastructures are in bad shape.

The proposed roads shall be of importance to the community since it will increase accessibility to schools, markets and health services as well make it easy for them to be improved.

4.2.5 Transport and Communication Services

The IMC is served with several transport services and infrastructure. It has a road network of 543.3 km of which only 4.9 percent are paved and cobbles roads while 95.1 percent are in poor condition. The Mwanza City is also served with air transport which is on the outskirt of Ilemela, located about 10 Km (6.2 mile) from the city center. Air Tanzania, a public airline, currently provides transport services from different destination to Mwanza on daily basis. Apart from Air Tanzania domestic flights, private sector companies also operate regularly from Mwanza Airport to places like Dodoma, Bukoba and Zanzibar.

Ilemela enjoys marine transport due to its access to the Lake Victoria. Public marine vessels are the major carriers of both passengers and cargoes destined for the neighboring lake zone regions - Kagera and Mara regions. There are also marine transport facilities connecting Mwanza Lake port with other lake ports of Kenya and Uganda. There are private marine vessels

mainly ferries which move passengers to and from Sengerema landing ports to Mwanza city, Ukerewe landing port and Mwanza City. Mwanza region is also served by the central line railway system that connects Ilemela 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.

The proposed road construction project will be advantageous since it will be an addition to the bitumen upgraded road network which means increased accessibility to many areas in Ilemela Municipality.

4.2.6 Electricity, Water and Sewerage Services

The main sources of energy in IMC are electricity, gas, paraffin, solar, firewood and charcoal. Electricity is mainly used for lighting while charcoal and firewood are mainly used for domestic purposes. The council faces various challenges related to electricity including unstable power supply, low voltage, rationing, and outages. The situation affects production of goods and services and opening of heavy industries. Water and sewerage services are provided by the Mwanza Urban Water and Sanitation Services Authority (MWAUWASA). The authority has the capacity to generate 108,011 cubic meters per day, but has a storage capacity of 76,233 cubic meters, which is below production capacity. The MWAUWASA sewerage connections cover approximately 101 Km and has increased slightly from 3,835 connections in 2017/18 to 4,143 connections in 2018/19. The large segment of Ilemela population is still not connected to the sewerage line.

The proposed road project may negatively affect these utilities since some of them may need to be relocated during implementation which will make it hard for some residents to lack water, electricity and sewerage services for some time. The proponent shall ensure the affected utility authorities are consulted and relocated accordingly.

4.2.7 Existing utility facilities within/close to the project area

Just few meters near the market there are service line from TANESCO, Sewer system and water line which owned by MWAUWASA. These service lines will probably be affected during construction and in the ongoing phase hence the lines will need to be relocated. The specific attention should to be taken to avoid environmental hazards by minimizing pollution at the site. On the ecological status of the area there are several trees where other fauna like bird's nests for breeding. These trees some of them will be removed completely to provide more space for construction works to take place. It is therefore more likely going to affect the habitat of fauna like vultures who found in the area. During project operation, generated solid waste will be transported to nearby designated disposal sites. During transportation, bad odor and waste falling from the back of trucks are likely to occur due to improper solid waste handling. This may result into nuisance to road users and people along the route.

4.3 Economic activities

4.3.1 Fisheries

Fishing activities in Ilemela has a long historical background, with about 850sq covered by water the Municipal has about 1,200 fishing vessels and 5,430 artisanal fishers who depend directly from the Lake. The introduction of Nile perch in 1950s to the Lake changed both the social and economic natural history of the sector. Today fishing is done mainly for commercial purposes, contrary to the traditional fishing which focused on household consumptions.

According to available statistics from the fish processing plants in Ilemela (Omega, Mwanza Fishing and Tan Perch), the fishing industry has created direct Employment for over 450 locals and outsiders and indirectly employed about 3000 others.

The proposed project positively affects fisheries in Ilemela since the fish products will be easily transported and reach the customers timely hence increase it marketing.

4.3.2 Agriculture and livestock

IMC is predominantly urban with 75% of its population residing in urban centers engaging in business and full-time Employment activities while the remaining 25% reside in rural areas engaged mainly in agriculture and livestock as their major undertakings. Crops grown include rice, maize, sunflower, maize, cabbage, sweet, peas, tomatoes, paddy, and fruits. Livestock keeping is also done in both rural and urban centers. The agriculture land in Ilemela Municipal is estimated to be 11,074 hectors which is suitable for both crop production and as a grazing land. The proposed road network improvement shall enhance transportation of agricultural goods to and from the Mwanza City centre, where markets are located.

4.3.3 Tourism and recreational activities

Mwanza region is one of the unique destinations in Tanzania that has yet to be discovered by many. It is a land of many wonders hubbing an unparalleled diversity of fauna, flora and many natural features. The wonders of Rockies, the scenery, topography and very friendly people harbour the growth of excellent Cultural tourism beach holidays, game hunting, infrastructural ventures, historical and archaeological ventures – and certainly the best wildlife photographic safaris on the continent.
The proposed roads will have a significant contribution to the tourism sector of the Municipality as some of the roads constructed have opened up new investment areas for tourist hotels.

4.3.4 Mining and quarrying

Ilemala Municipality is blessed with rocks, with rich mineral depositions, including granites and sands. All these are termed as building minerals. Currently extraction is made by private individuals, building and road contractors who extracting building materials. About 120,000 tons of sands and 500,000 tons of granites (stones) are produced per month. The extraction is done at Buhongwa, Mkolani, Igoma, Mahina and Butimba. It is expected that the proposed projects will source construction materials from these existing sources and this will cause the depletion of the resources.

4.4 Biological Environment

Biodiversity conservation and management is a crucial aspect of maintenance of ecosystem services that are essential for the life support of plants, human and other animals. Environmental degradation results in reduced supply of crucial environmental resources such as clean water, air, as well as fertile soils. The main objective of Environmental assessment is to ensure that the proposed projects do not degrade the environment.

4.4.1 Flora

The Ilemela-Kirumba natural water ways traverse through the central part of the municipality. The riparian vegetation that exists within and along the water ways comprise a variety of scattered exotic tree species and wetland plants.

Terrestrial vegetation exists in the form of scattered trees and grasses. Tree species are mainly composed of exotic shades, ornamental as well as fruit trees. They include Accacia species (Mgunga), Albizia species (Mkenge), *Azadirachta indica* (Mwarobaini), Ficus species (Mkuyu), *Elaeis guineense* (Mchikichi), Citrus species (Mchungwa), *Mangifera indica* (Mwembe), *Psidium guajava* (Mpera) and *Syzygium cumini* (Mzambarau).

4.4.2 Fauna

Main fauna reported by locals include small animals such as hares, rats, reptiles, arthropods, butterflies, grasshoppers, ants of various kinds and other insects commonly found in urban areas. Birds seen and reported on site were mainly owls, swallows, pigeons and Marabou Stork (*Leptoptilos crumeniferus*) white – headed vultures with long beak (local name ndege mwarabu). No wild animals reported or observed in the project sites. Only domestic animals i.e., cattle, goats, sheep and poultry were observed and reported by stakeholders.

4.5 Land use of the project area

Most of residential houses and business structures in Ilemela are made up of cement blocks with corrugated aluminium roofing. Some are made of burned bricks or steel with corrugated aluminium roofing. The project area is dominated by residential houses, garages, business buildings shops, salon, petty businesses, skip bucket, cargo vehicles parking, mama lishe and offices. The proposed roads are located at a surveyed area with mostly planned settlements and paved access roads.

4.6 The Current Situation of the Proposed Roads

4.6.1 Condition of Road Corridor (Buswelu – Nyamadoke – Nyamhongolo Road - 9.5km)

Along the road alignment there are reasonable number of houses and some will require to be relocated for attaining horizontal alignment of the road; introduction of culverts at sharp corners; and construction of bays and other road furniture (**Figure 4.2).** Therefore, the road will require compensation of land and other assets thus warranting preparation of Resettlement Action Plan (RAP).

Figure 4.2**:** Section of the Nyamadoke-Nyamhongolo road (left) and houses that are likely to be affected by the project (right). (**Source:** Field work, 2022)

4.6.2 Condition of Road Corridor (Busenga – Coca - Cola Road - 3.3 km)

The road traverses through the existing gravel road and in some sections, it is characterized by broad wetland area on which paddy, maize, and vegetables are grown (**Figure 4.3**). The wetland is also used for grazing livestock. This area is prone to flooding hence may require a detailed study on flooding characteristic during design.

Figure 4.3**:** A wetland along Busenga – Coca Cola Road (Source: Consultant, January 2022)

Along the road alignment there are reasonable number of houses and electric lines which will require relocation for attaining horizontal alignment of the road; introduction of culverts at sharp corners; and construction of bays and other road furniture (**Figure 4.4)**. Therefore, the road will require compensation of land and other assets thus warranting preparation of Resettlement Action Plan (RAP).

Figure 4.4**:** Electric lines along the proposed road (Source: Consultant, January 2022)

4.7 Environmental Baseline Information

4.7.1 Water supply

Water supply and sewerage services in Mwanza City (Ilemela and Nyamagana) is provided by the Mwanza Urban Water supply and Sanitation Authority (MWAUWASA). The core responsibility of MWAUWASA is to supply safe and clean water abstracted from Lake Victoria mainly at Capri-point intake station treated by a modern Capri-point Water Treatment Plant to meet required water quality standards and distributed through water piped networks to customers in Mwanza City and other designated operational areas such as Kisesa Township.

Due to topographical nature of Mwanza City, MWAUWASA operates about seven (7) booster stations located at different points of the City for pumping safe and clean water from the Treatment Plant to reservoirs (water storage tanks) at elevated or hilly areas in the City. The main booster stations are located at Mabatini, Kona ya Bwiru, and Nyegezi. Water distribution network pipes have now a total length of about 700 km with different pipe sizes ranging from 1.5" to 28". From the water storage tanks, safe and clean water is supplied to customers for consumption through piped networks. Water production stands at 85,000 m3 per day, but currently the demand amounts to 105,000 m3 per day on average.

According to National Bureau of Statistics census of 2012 in Tanzania, Mwanza City being the second largest urban centre in Tanzania has a population of approximate 800,000 people. Out of this number, about 73% are in the water service coverage area being served by MWAUWASA. The number of population includes that for Nyamagana and Ilemela Municipal. MWAUWASA also serves a population of 30,486 Kisesa people in Magu Municipal. Accessibility to water supply services in Ilemela is approximated at 90% in Urban and 30% in Rural.

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. Also, the proposed road construction works may affect water supply infrastructure causing cut-off and water shortages in some areas whereby these infrastructures may need to be relocated.

4.7.2 Solid waste management

In Ilemela Municipality solid waste collection is done under the public private partnership concept (PPP). The Council has decentralized authority to the mitaa/ward level for all issues concerning tendering contracts on Solid waste management, in this case using the public procurement procedure, interested partners bid for the job.

Currently, there are 43 solid waste management private partners (CBOs & Companies) in 78 (46%) Mitaa which are responsible for street cleansing and solid waste collection from households, shops, markets and any other business premises and take them to the nearest collection point situated in each ward. The estimated solid waste production in municipality is approximately 692 tons per day including all types of wastes from households, industries, commercial areas and market. It is estimated that about 11.2% of the daily solid waste generated i.e. (77.5 tons) is used as recyclable material and animal feed. All hazardous waste such as healthcare infectious wastes are not accounted as municipal wastes because they are managed as a separate stream.

The council has a capacity of collecting 436 (63%) of total waste produced per day in 14 improvised collection points through CBOs and private companies; and due to limited resources; council has a capacity of disposing only 56 (13%) of total waste collected daily by using its own vehicles (1 vehicle). The rest of solid wastes collected 380 tons (87%) are attended by using contracted vehicles. Currently, Ilemela do not possess any final disposal point (land fill) although there is land set aside for construction of landfill for safe and environmentally friendly treatment of solid and liquid waste. Therefore, the council uses the solid and liquid waste management facilities found in Mwanza City. Moreover, as part of solid waste management also within this unit there are activities of management of 23 cemetery yards allocated in 19 wards, all of them have no offices and not fenced as well as there is no cemetery attendant assigned/employed to take care of these areas as requirement of The Public Health Act No. 1 of 2009.

The proposed project will have a proper solid waste management plan in all phases so that it does not add a burden to the existing challenge.

4.7.3 Sanitation

Ilemela Municipal does not have good waste disposal system; therefore there are no proper ways of disposing solid and water waste. 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 and uncollected garbage pollute the environment of the municipality. However, the 2012 Population and Housing Census Report shows a slight decrease in households with no toilet facility from 12.2 % in 2002 to eight (8.3%) in 2012. Also, the use of traditional pit latrines in Mwanza region decreased from 81.7 % in 2002 to 68.3 % in 2012, while households with flush toilets increased from 3.6 % to 20.8 % in the same period. The status of sanitation in Ilemela MC at the end of 2015 indicates that out of 76,297 about 71,559 households had toilet facilities, equivalent to 93.8% of the total households in the council and 6.2% were households without toilets.

There are sewerage services provided by MWAUWASA sewage management and other liquid waste. The central sewerage system covers only the central part of Mwanza City and a few neighborhoods such as Kirumba and Pasiansi. The wastewater treatment plant located in Ilemela Municipality has a capacity of 7000 m^3/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.

4.7.4 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 130dB. The Sound level metre meets ANSI S1.4 type 2 standards and conforms to IEC 60651 type 2. Equipment accuracy is ±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 four (4) readings

were taken for Buswelu – Busenga – Cocacola road and Buswelu – Nyamadoke – Nyamahongolo 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 in Tables 4.1 & 4.2. The lowest and the highest values were recorded and then compared with local standards, Tanzania Bureau of Standards (TBS) and IFC standards. The study took place on 30th December, 2022 between 11:30am to 16:20 pm for proposed project areas in Ilemela Municipal Council.

Table 4:1: Sound Levels Monitoring Data at proposed Buswelu – Busenga – Cocacola Road

Date dd/mm/yy	**Location**	**Coordinates (Degrees)**	**Sound level (dBA)** (Accuracy ±3.5 at 94 dBA)		
			Lowest	**Highest**	**Average**
29.12.2022	Buswelu Centre	S02.515522 E32.973659	56.9	57.3	57.1
29.12.2022	Busenga	S02.524834 E32.977104	39.8	40.5	40.2
29.12.2022	Cocacola Road	S02.541732 E32.973724	47.4	47.8	47.6
Tanzania Standards as per Tanzania Bureau of Standards (TBS) 70 dB(A)					
IFC Noise level Guidelines for Industrial and commercial receptors 70 dB(A)[6]					

(Source: Consultant, 2022)

Table 4:2: Sound Levels Monitoring Data at proposed Buswelu – Nyamadoke – Nyamahongolo Road

Date dd/mm/yy	**Location**	**Coordinates (Degrees)**	**Sound level (dBA)** (Accuracy ±3.5 at 94 dBA)		
			Lowest	**Highest**	**Average**
29.12.2022	Nyamahongolo Centre	S02.548440 E32.001273	66.3	66.8	66.6
29.12.2022	Kagua	S02.883170 E32.316444	67.8	68.2	68.0
29.12.2022	Nyamadoke	S02.884485 E32.312634	54.6	59.7	57.2
29.12.2022	Buswelu A	S02.883171 E32.316402	55.7	59.8	57.8
Tanzania Standards as per Tanzania Bureau of Standards (TBS) 70 dB(A)					
IFC Noise level Guidelines for Industrial and commercial receptors 70 dB(A)[7]					

(Source: Consultant, 2022)

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

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

4.7.5 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_2 and CO_2 in ppm, PM_{10} in µg/m3, $PM_{2.5}$ in µg/m^3, TVOC in mg/m^3, temperature and humidity in the environmental air. The study took place on 29th December, 2022 between 11:30 pm to 4:20 pm for the proposed Buswelu – Busenga – Cocacola and Buswelu – Nyamadoke – Nyamahongolo Roads in Ilemela. 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 $PM_{2.5}$ and PM_{10} found to range between 5 and 41 µg/m3 and 5 and 52 µg/m^3, respectively. Based on the results, the average $PM_{2.5}$ and PM_{10} 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 4.3 & 4.4. The average measured concentrations of Total Volatile Organic Compounds (TVOC), Carbon monoxide (CO) in ppm, Nitrogen dioxide (NO_2) in ppm and Carbon dioxide (CO_2) presented in Table 4.3 & 4.4. 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.

Table 4:3**:** Ambient air quality concentrations measured at the proposed Buswelu – Busenga – Cocacola Road

Location	**Coordinates (Degrees)**	**Measured Dust Parameter** (µg/m^3)		**TVOC** (mg/m^3)	**NO_2** (ppm)	**CO_2** (ppm)	**CO** (ppm)
		$PM_{2.5}$	**PM_{10}**				
Buswelu Centre	S02.515522 E32.973659	5	11	0.1	0.02	316	0.0
Busenga	S02.524834 E32.977104	6	8	0.0	0.0	324	0.0
Cocacola Road	S02.541732 E32.973724	8	9	0.0	0.0	329	0.0
The Environmental Management (Air Quality Standards) Regulations, 2007 and TBS Standards		**40**	**60 – 90**		**0.1 ppm for 8 hours of exposure**		**90 ppm for 15 minutes of exposure**
WHO/IFS Standards		**25 for 24 – hour mean**	**50 for 24 – hour mean**	**0.3 – 0.5**	**0.3 ppm for 30 minutes of exposure**	**400 – 1000**	**90 ppm for 15 minutes of exposure**

(Source: Consultant, 2022)

Table 4:4: Ambient air quality concentrations at the proposed Buswelu – Nyamadoke – Nyamahongolo Road

Location	**Coordinates (Degrees)**	**Measured Dust Parameter** ($\mu g/m^3$)		**TVOC** (mg/m^3)	**NO_2** (ppm)	**CO_2** (ppm)	**CO** (ppm)
		$PM_{2.5}$	**PM_{10}**				
Nyamahongolo Centre	S02.548440 E32.001273	7	7	0.11	0.1	293	0.0
Kagua	S02.883170 E32.316444	4	5	0.1	0.0	349	0.0
Nyamadoke	S02.884485 E32.312634	41	52	0.13	0.2	316	3.0
Buswelu A	S02.883171 E32.316402	29	33	0.1	0.1	377	12.0
The Environmental Management (Air Quality Standards) Regulations, 2007 and TBS Standards		**40**	**60 – 90**		**0.1 ppm for 8 hours of exposure**		**90 ppm for 15 minutes of exposure**
WHO/IFS Standards		**25 for 24 – hour mean**	**50 for 24 – hour mean**	**0.3 – 0.5**	**0.3 ppm for 30 minutes of exposure**	**400 – 1000**	**90 ppm for 15 minutes of exposure**

(Source: Consultant, 2022)

4.7.6 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 ±3/3.5% reading ±2°C (at -20°C~+200°C) and ±5% RH (at 25°C, 35%~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 metre 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 as shown on tables 4.5 & 4.6. The values were recorded and then compared with meteorological data from Tanzania Meteorological Authority (TMA). The study took place on 29th December, 2022 between 08:30am to 18:20 pm for proposed project areas in Ilemela Municipality.

Table 4:5: Temperature and Relative Humidity Monitoring Data at proposed project site - Buswelu – Busenga – Cocacola Road

Date dd/mm/yy	**Location**	**Coordinates** (Degrees)	**Temperature** (◦C)	**Relative Humidity** (%)
29.12.2022	Buswelu Centre	S02.515522 E32.973659	26.1	63.3
29.12.2022	Busenga	S02.524834 E32.977104	29.3	52.8
29.12.2022	Cocacola Road	S02.541732 E32.973724	26.2	52.6

(Source: Consultant, 2022)

Table 4:6: Temperature and Relative Humidity Monitoring Data at proposed project site - Buswelu – Nyamadoke – Nyamahongolo Road

Date dd/mm/yy	**Location**	**Coordinates** (Degrees)	**Temperature** (◦C)	**Relative Humidity** (%)
29.12.2022	Nyamahongolo Centre	S02.548440 E32.001273	31.4	65.4
29.12.2022	Kagua	S02.883170 E32.316444	28.0	63.7
29.12.2022	Nyamadoke	S02.884485 E32.312634	26.5	69.9
29.12.2022	Buswelu A	S02.883171 E32.316402	26.9	67.7

(Source: Consultant, 2022)

4.7.7 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 sites have no gaseous contaminants of all flue gases such as Sulphur dioxide (SO_2), Carbon monoxide (CO) and Nitrogen oxides (NO/NO_X). 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[8] and this is one of the nine compulsory environmental standards developed by the Tanzania Bureau of Standards and collated in the National Environmental Standards

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

Compendium. In general, the air quality standards contain the same tables of limit or guideline values as the regulations as shown on Table 4.7 & 4.8.

Table 4:7: Findings of Flue gases at proposed Buswelu – Busenga – Cocacola Road

Date dd/mm/yy	Sampling point	Coordinates	Flue Temperature (◦F)	Air Temperature (◦F)	O_2 (%)	CO (ppm)	NO (ppm)	NO_X (ppm)	SO_2 (ppm)	Temperature Difference (◦F)
29.12.2022	Buswelu Centre	S02.515522 E32.973659	80.4	84.2	20.90	0.00	0.00	1.05	0.00	-3.8
29.12.2022	Busenga	S02.524834 E32.977104	80.2	83.8	20.90	0.00	0.00	1.05	0.00	-3.6
29.12.2022	Cocacola Road	S02.541732 E32.973724	76.6	85.1	20.90	0.00	0.00	1.05	0.00	-8.5
Tanzania Bureau of Standards (TBS) Limits			-	-	-	**0.01**	**0.00012**	**0.00012**	**0.0005**	

(Source: Primary data/Consultant, 2022)

Table 4:8: Findings of Flue gases at proposed Buswelu – Nyamadoke – Nyamahongolo Road

Date dd/mm/yy	Sampling point	Coordinates	Flue Temperature (◦F)	Air Temperature (◦F)	O_2 (%)	CO (ppm)	NO (ppm)	NO_X (ppm)	SO_2 (ppm)	Temp. Difference (◦F)
29.12.2022	Nyamahongolo Centre	S02.548440 E32.001273	78.30	85.10	20.90	0.00	0.00	1.05	0.00	-6.8
29.12.2022	Kagua	S02.883170 E32.316444	79.20	84.90	20.90	0.00	0.00	1.05	0.00	-5.7
29.12.2022	Nyamadoke	S02.884485 E32.312634	77.90	84.40	20.90	0.00	0.00	1.05	0.00	-6.5
29.12.2022	Buswelu A	S02.883171 E32.316402	80.40	84.60	20.90	0.00	0.00	1.05	0.00	-4.2
Tanzania Bureau of Standards (TBS) Limits			-	-	-	**0.01**	**0.00012**	**0.00012**	**0.0005**	

(Source: Primary data/Consultant, 2022)

4.14.8 Ground Vibrations

Ground vibrations were measured at 3 locations of the proposed Buswelu – Busenga – Cocacola Road and 4 locations of the proposed Buswelu – Nyamadoke – Nyamahongolo Road 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 ±5% ±2 digits, acceleration of 1-199.9 m/s2, 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 1.13 and 1.6 mm/s at the proposed Buswelu – Busenga – Cocacola Road and Buswelu – Nyamadoke – Nyamahongolo Road respectively (Table 4.9 & 4.10). 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 4:9: Ground vibrations levels along the proposed Buswelu – Busenga – Cocacola Road

Location	**Coordinates** (Degrees)	**Ground vibrations** (mm/s)
Buswelu Centre	S02.515522 E32.973659	1.0
Busenga	S02.524834 E32.977104	0.9
Cocacola Road	S02.541732 E32.973724	1.5
Average		1.13
Environmental Management (Standards for the Control of Noise and Vibrations Pollution) Regulations, 2015		**5 mm/s PPV at all times**

(Source: Consultant, 2022)

Table 4:10: Ground vibrations levels along the proposed Buswelu – Nyamadoke – Nyamahongolo Road

Location	**Coordinates** (Degrees)	**Ground vibrations** (mm/s)
Nyamahongolo Centre	S02.548440 E32.001273	2.0
Kagua	S02.883170 E32.316444	1.0
Nyamadoke	S02.884485 E32.312634	0.9
Buswelu A	S02.883171 E32.316402	2.5
Average		1.6
Environmental Management (Standards for the Control of Noise and Vibrations Pollution) Regulations, 2015		**5 mm/s PPV at all times**

(Source: Consultant, 2022)

CHAPTER FIVE

STAKEHOLDER CONSULTATIONS AND PUBLIC INVOLVEMENT

5.1 Introduction

Public consultation is an essential requirement of the environmental impacts 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. 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 EIA 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 Villages/Vitongoji located along the proposed roads within Ilemela Municipal Councils. The comments received and issues raised from these public participation exercises have incorporated not only to enrich the report but also attached as appendix 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;

- Ilemela Municipal Council
- Mwanza Water Supply and Sanitation Authority (MWAUWASA)
- TANESCO Mwanza Regional Office
- Tanzania Forest Services Agency (TFS)
- Lake Victoria Basin Water Board (LVBWB)
- TARURA – Mwanza region
- Buswelu and Nyamhongolo ward leaders (**Figure 5.1**)

- Mitaa leaders in the project areas
- Local communities
- Petty traders along the proposed roads

Figure 5.1**:** Stakeholder consultation with Buswelu ward leaders (Source: Consultant, January 2022)

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. The following were some of the issues raised during stakeholder consultation.

-Relocation of the Utilities/Infrastructure: The project site has utilities crossing or running parallel such as those for TANESCO, MWAUWASA, TRL and TTCL. It was observed that the cost for relocation of the infrastructures is incurred by developer (IMC) and must be part of the budget for the proposed project. These authorities/companies must be involved from the initial stages of the project planning and execution.

-Soil/Water/Air Pollution: during construction, the contractor should be careful with the rivers/streams by avoiding spillage of oil, haphazard dumping of waste, dust generation and emission of air pollutants from machineries.

-Compensation of affected properties: Even though the proposed road shall maintain the same existing alignment although the stakeholders are still worried that some properties shall be affected. 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.

-Interaction between local communities and influx of labourers during construction should be monitored: Representatives of local communities are concerned about the impact which might be caused by the influx of labourers during construction which might lead to increased

cases of violence, HIV/AIDS and social unrest. The representatives emphasized on the need for the Municipality 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 detailed concerns and comments of all stakeholders were recorded and are presented here in **Table 5.1.**

Table 5:1**:** Stakeholders' views and concerns from Ilemela Municipal Council

S/N	Stakeholder	Views, Concerns / Questions	Response
1.	**Municipal Director's Office** -Jumanne Maseke (Social Focal Person) -Phinias B. Marcon (Environmental Management Officer) -Juma T. King'ola (Project Coordination Engineer)	• The Municipal Council have made all necessary preparations for the execution of the project. • The local communities are aware of the project as they have been involving them from the beginning) • The proposed subprojects including the markets in line with the master plan. • The land where the proposed subprojects are located belongs to the Municipal Council though relocation and compensation might be needed in some few areas. • All structures currently existing at the market belongs to the Council. • The traders from Kirumba Market will be temporarily relocated to Magomeni area to pave the way for market construction. • The relocation is already selected by Kirumba Market traders themselves. • No any preparations have been made to the temporary site. The traders will construct their own stalls. • They are not aware if a temporary relocation plan is required to guide the traders' temporary relocation process. • They made it clear that, they need Consultant's guidance on this and they are willing to preparing. • The market design is not prepared yet but they think it will be a storey building.	Temporary relocation plan should be prepared by the MC to guide the process and ensure smooth relocation of the traders.
A. Upgrading of Buswelu- Busenga-Cocacola (3.3 km) Road to Bitumen Standard			

2.	**Buswelu- Ward Office** (Ward Development Committee) -Sara Paul Ng'wani (WC) -Winifrida Elia Gyunda (WC-Special Seats) -Maarufu A. Mohamed (WEO) -Fidelis Kiryaro (CDO) -Yohana L. Chimama (HO) -Mgega J. Buluma (Chairperson – Buswelu) -Linda John (MEO-Buswelu A) -Matrida Mwanjisi (Chairperson – Buswelu B) -Juma Habib (MEO-Buswelu B) -Silvester Clement (Chairperson-Bujingwa) -Shokha Mhango (Chairperson-Busenga) -Elias Malipesa (Chairperson - Bulola A) -Joseph B. Masunga (Chairperson-Bulola B) -Damian M. Maya (MEO-Bulola Mima) -Hamisi Magawila (MEO-Kigala) -Sarah Temba (MEO)	• The WDC members are aware of the project and they are ready to cooperate. • There should be a continuous involvement and participation of stakeholders especially the communities. • The upgrading of the proposed road should consider provision of bus stops provided with sheds; • The road should be provided with standard storm water drainages (deep and wide enough to accommodate water flow) and they shouldn't be directed to the peoples' houses • Side pedestrian walkways and crossings, bumps and road lights should be considered for safety of road users. • During construction local communities especially the youths, should be given a priority in Employment opportunities especially for semi-skilled and unskilled position. • The architectural design should consider the provision of enough wayleave for future expansion and for utilities infrastructures. • Is there is any compensation plan for houses that will be affected? • They wanted to know when the project will start. And how long will it last and if the fund is there already. • Considering Ilemela Municipal has Market Construction Projects and roads, will all projects start at once? Or there will be intervals. If there will be interval, they would suggest roads project to be the first one to be implemented.	• The project will start soon after the completion of feasibility studies, designs and environmental and social clearance. The local leaders and the communities will be informed on each step. • RAP will be prepared for all affected assets for compensation purposes. • About Employment, the contractors will prepare labor recruitment and management plan in which they will state clearly how the local communities will be considered. • The youths need to be prepared and be trustful.

	-Daniel C. Kagaruki (Chairperson-Majengo) -Juma John Owino (Chairperson-Zembwela) -Augustino M. Julius (MEO - Zembwela)		
B. Upgrading of Buswelu- Nyamadoke-Nyamhongolo-road (9.5 Km) Road to Bitumen Standard			
3.	**Nyamhongolo Ward Office** (Ward Development Committee) -Andrea A. Nginila (WC) -Safia M. Mkama (WC-Special Seats) -Daudi G. Lumazi (Ag. WEO) -Judith M. Mgaza (FSO) -Geophrey Bigambo (SLFO) -Peter Luhaga (Chairperson-Nyamhongolo) -Mussa Manyilizu (Chairperson-Nyamadoke) -Oscar S. Ndunguru (MEO-Nyamadoke) -Adam R. Magina (Chairperson-Mtakuja) -Paul James Matenga (Chairperson-Ibinza) -Milembe J. Lugiko (MEO-Ibinza) -Michael Nyanda (Chairperson-Iramba A)	• The WDC executives have positive attitude about the project and they are eagerly waiting for its start. • They are giving precaution to the designer to be keen on how to accommodate the Nyamadoke Valley (wet land). • The road should be provided with a bridge to allow water to pass under the bridge if possible. • The upgrading of the proposed road should consider provision of bus stops provided with sheds; • About storm water and drainage system the consideration should be on where should water be directed since people have encroached the water pathways so the engineers should thoroughly consult the Ward and Mtaa executive and the local communities. • The road should be provided with road lights and many bumps as possible to avoid accidents. • The road should be provided with side walkways for pedestrians without forgetting the signs for people with disabilities. • During construction local communities especially the youths, should be given a priority in Employment opportunities especially for semi-skilled and unskilled position. • They wanted to know when the project will start.	• The project will start soon after the completion of feasibility studies, designs and environmental and social clearance. The local leaders and the communities will be informed on each step. • RAP will be prepared for all affected assets for compensation purposes.

	-Nkuba Charles (MEO-Ilamba A) -Samwel John (Chairperson-Ilamba B) -Emmanuel J. Maseko (Chairperson- Iwelyashinga) -Boniphace M.Nkingwa (MEO-Iwelyashinga) -Selemani Mabina (Chairperson-Kaguhwa)	• They wanted to know if there is compensation plan for the houses that will be affected.	
4.	**Road Construction Buswelu-Busenga-Cocacola (3.3 km)** (Attached Participant List)	• The WDC executives are aware of the project and they are positive about it. They are ready and waiting for it to start. • They want bus stops along the road after completion • They want standard storm water drainage system (should be wide) and should not directed to the people's house • Involvement and participation of stakeholders should continue • Bumps should be taken into consideration to control accidents at least three bumps • Security lights • Sidewalks and foot paths should be considered in terms of safety and accessibility • During construction local youths should be given priority to work in the project especially for unskilled labour. • They suggest the architect design should consider the utilities infrastructure plans for future use • They wanted to know when the project will start. And how long will it last. • And if the Fund is there already or not • Considering Ilemela Municipal has Market Construction Projects and roads, will all projects start at once? Or there will be	• The project will start soon after the completion of feasibility studies more likely after 6 months from now. • There will a RAP for those who their house will be affected • The village executives should be keen to make sure no one is elevating any new structure along the road from today onwards • About Employment priorities the youths need to be prepared to prove

		intervals. If there will interval, they would suggest roads project to be the first one to be implemented. • They wanted to know if there is compensation plan for those whose houses will be affected.	they can be trusted because there have been a lot of complains from the contractors that the local youths are thieves.
5.	**Nyamohongolo Ward Buswelu-Nyamadoke-Nyamongolo-road**	• The WDC executives have positive attitude about the project and they are eagerly waiting for its start. • They are giving precaution to the designer to be keen on how to accommodate the Nyamadoke Valley (wet land) in his/her work. • They suggest the road to be uplifted and allow water to pass under the bridge if possible. • They would like to have bus stops along the road after its completion. • About storm water and drainage system the consideration should be on where should water be directed since people have encroached the water pathways so the engineers should not skip the role of ward and mtaa executive for consultation. • They would like to have Bumps as many as it can be to avoid accidents after completion of the project. • Security lights is also their concern. • Sidewalks should be separated well for people, motorcycle and tricycle without forgetting people with disability signs. • Local youths should be given priority to work in the project especially for unskilled labour. • They wanted to know when the project will start. • They wanted to know if there is compensation plan for those whom their houses will be affected.	There will be compensation plan after evaluation

6.	**MWAUWASA** Eng. Salim Lossindilo (Director of Water Supply and Sanitation - DWSS)	• There are MWAUWASA infrastructures for water supply and sewerage in the proposed project area. • Kirumba area has many infrastructures that may need to be relocated during construction of roads and market too and the implicated cost should be covered by the contractor of the proposed project. • The pipes must be placed in the road sides and not anywhere else. • 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.	The proponent shall liaise with the contractor to make sure that all the necessary procedures are followed to avoid any losses or effects to the community that may result from affected MWAUWASA infrastructures.
7.	**Lake Victoria Basin Water Board (LVBWB)** • Eng. Renatus Shinhu (Basin Water Director) Batuli Seif (Community Development Officer – CDO)	• The proposed project is beneficial to the Ilemela, Mwanza region and the country at large. • 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 by using boozers.	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.
8.	**TANESCO - Mwanza Region** Eng. Abdallah Mitenda (Ag. Regional Manager)	• The proposed project will be beneficial since the number of customers will increase and through relocation in some areas TANESCO infrastructures shall be upgraded. • 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.	The proponent will make take all these into consideration and work on them accordingly.

9.	**Tanzania Forest Services Agency (TFS)** • Bakari S. Mohamed (Zonal Manager) Thomas Moshi (Assistant Zonal Manager)	• There are no forest reserves in the proposed project area. • Environmental conservation education should be provided among the communities this will make the city upgrade of infrastructures more meaningful. • Plant trees along the road reserves to protect against possible soil erosions resulting from floods during rainy seasons. • There should be stormwater drains along the roads.	The environment shall be well conserved by tree and grass planting where necessary and waste from the project activities shall be well managed.

5.3 Stakeholders Consultation during Implementation

During Project implementation, engagement activities will be undertaken in relation to project activities. At this stage a number of structured and formal meetings, focus group discussions, community meetings, one to one interview, distribution of information (pamphlets) and site visits will be conducted. The timing for the conducts of the meetings will be determined by the progress of the project implementation and when seems necessary to invite stakeholders for their comments and observation. However, the sharing of information and progress with stakeholders will be subject to scrutiny with regards to the kind of information to be shared and how the same will be communicated to both stakeholders, PAPs and OIPs. Furthermore, at this stage, the Ilemela Municipal Council will ensure equal and effective participation from project preparation to implementation stages. To ensure stakeholders' views and concerns are well captured, the Municipal will have different methods of collecting information based on their needs i.e., disadvantaged or vulnerable groups.

CHAPTER SIX

ASSESSMENT OF IMPACTS AND IDENTIFICATION OF ALTERNATIVES

6.1 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 (ESMP).

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:

Collection of Baseline Data

The collection of baseline data was conducted subsequent to defining the scope of the EIA. 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.

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.

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 EIA 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 EIA *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:
-Sesource 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 6.1** describes the ratings used in the Simple Matrix as far as spatial scale is concerned.

Table 6:1**:** 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 6.2** describes the ratings used in the Simple Matrix.

Table 6:2**:** 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 6.3** show types of cummulative impacts;

Table 6:3**:** 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 crowding	High spatial density of effects	Numerous small mining enterprises 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.

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, IMC have the mandate to develop and maintain the urban infrastructures within the Municipality. Its primary function includes the maintenance and development of the infrastructures to support the economic and social development of in the Region. They will also be responsible for addressing the environmental issues posed by the subprojects. The proposed infrastructures will be under the Municipal engineers while solid waste collection and disposal will be under the Municipal health officers.

From the central government line of administration, by virtue of their location, the urban infrastructures to be developed by this project in Ilemela Municipal Council is under the jurisdiction of the Municipal 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.

6.3.1 Potential Environmental and Social Impacts

The following impacts were identified to be likely to occur during pre-construction phase of the proposed road projects;

- Employment opportunities (in construction works)
- Change of scenery view of the project areas
- Increased generation of dust and air pollution
- Loss of property (shop structures)
- Traffic flow disruption and congestion

The following impacts were identified to be likely to occur during construction phase of the proposed road projects;

- Employment opportunities (in construction works)
- Increased generation of dust and air pollution
- Increased generation noise and vibrations
- Visual intrusion during construction
- Increased waste generation
- Loss of definite materials and land degradation
- Interuption or lack of utility servives due to damage/relocation of existing utility infrastructure
- Traffic flow disruption and congestion
- Lacking or slow restoration of areas impacted by construction
- Health and safety risks to worker's and the general public
- Impacts due to operation of the asphalt plant and campsite
- Overburdened local authority
- Child labour
- Increased spread of communicable disease especially HIV/AIDS
- Population Influx

The following impacts were identified to be likely to occur during operational phase of the proposed road rehabilitation projects;

- Improved accessibility and connectivity of the project areas
- Improvements in collection of road surface runoffs
- Increased property and land values around the project areas

- Increased revenue collection by IMC
- Enhancement of safety and security status of the project areas through the provision of traffic lights, walk ways and road signs
- Enhancement of aesthetic values of the project areas
- Reduction of health risk related to dust dispersion and deposition at the project areas
- Risks for increase in road accidents
- Environmental hazards resulting from waste deposition into storm water drains
- Increase in risks for pollution of surface and ground water

Impact assessment and evaluation was done using simple methods (checklists) and procedures (existing structures at local authorities). It is envisaged that the anticipated impacts from development of the infrastructure sub-projects in Ilemela Municipal will be short-term, site specific, confined, reversible and can be managed through the application of a set of mitigation and monitoring measures presented in the Environmental and Social Management Plan (ESMP). The ESMP clearly indicates the institutional responsibilities with regard to implementing mitigation measures, monitoring of the implementation of these mitigation measures and related cost estimates and time horizons. Further, the ESIA has assessed the capacity of the Municipal Council to implement the proposed screening process and mitigation measures. The Council has previous experience with management of environmental and social issues related to construction/ civil works under Ilemela Municipal Council. The interaction between the intended project activities and the different environmental receptors are summarized in a simplified matrix presented in **Table 6.4.**

6.3.2 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.

+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 6:4**:** Environmental and Social Impacts Matrix for the Proposed Roads at the Ilemela Municipal Council

		Impact Rating Criteria					Impact Significance Rating			
S/N	**Environmental parameters/Impacts**	**Spatial Scale**	**Temporal Scale**	**Reversibility**	**Cumulative Effects**	**Residual Impact**	**Mobilization Phase**	**Construction Phase**	**Demobilization Phase**	**Operation and Maintenance**
	Negative Impacts									
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
	Positive Impacts									
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;

Positive Social Impacts

(a) Job creation and increased income

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

Positive Social Impacts

(b) Job creation and increased income

Negative Social Impacts

(c) Destruction of other infrastructures
(d) Increase road accidents
(e) Safety and health risks

Negative Environmental Impacts

(f) Soil erosion and instability of slopes
(g) Increased Water and Land Pollution
(h) Noise, vibration and air pollution
(i) Increased Waste
(j) Loss of Scenic Quality
(k) Loss of Vegetation
(l) Population influx

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

Positive Social Impacts

(m) Improved transport and economy of people
(n) Reduced traffic congestion
(o) Enhancement of safety and security status of the project areas
(p) Employment opportunities and increased income to local communities

Negative Social Impacts

(q) Increase road accidents
(r) Increased traffic generated noise and vibration
(s) Improved community life and services

Negative Environmental Impacts

(t) Hazards related to waste deposition into storm water drains

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

6.4 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 Ilemela Municipality. 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.

6.5 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 Ilemela Municipality. 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 Social Impacts

Destruction of other infrastructures

Some of the infrastructure such as 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

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.

Increased Road Accidents

Increased traffic 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.

Negative Environmental Impacts

Soil Erosion and Instability of Slopes

Construction works 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 during Construction Phase

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. The quantities and types of wastes were presented in chapter 2.

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.

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.

Increased 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 Road Accidents

Increased traffic 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 Ilemela Municipal 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.

6.6 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 Ilemela Municipal 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 Ilemela Municipal 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, Ilemela Municipal 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.

6.7 Decommissioning Phase Impacts

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.

6.8 Analysis of Alternatives

6.8.1 Overview

In the EIA 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 EIA consultations with stakeholders and site visits provided basis for identifying alternatives. The following types of alternatives are presented for consideration:

6.8.2 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 Ilemela Municipal Council.

6.8.3 Alternatives Sites

There are many Roads in Ilemela Municipal Council which are in poor conditions than the selected project roads. However due to limited resources these roads 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 issues Ilemela Municipal Council area.

6.8.4 **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.

6.8.5 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 same 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.

6.8.6 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.

6.8.7 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.

6.8.8 Water Sources Alternative

The water source for the proposed project is Lake Victoria. This option was choosen because Lake Victoria is capable of providing the amount of water that will be required for the proposed construction activities. Alternatively, water from boreholes around the project areas 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 wll 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.

6.9 Impacts Mitigation Measures

6.9.1 General Considerations

This chapter is 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 nothing more than good engineering practice that shall be adhered to during the design and construction phases. The developer is committed to the implementation of mitigation measures contained in this report.

6.9.2 Mitigation Measures for Construction Phase Impacts

Destruction of Public Utilities

i. The authorities managing these infrastructures (TRL, TANESCO, TTCL and MWAUWASA) should be involved from the early stages of this project have an integrated planning.
ii. Early notice should be given to the community before any service interruption
iii. The funds for the relocation of this infrastructure should be part and parcel of the project.

Soil Erosion and Instability of Slopes

i. Unnecessary ground clearance and sensitive re-alignments shall be avoided.
ii. 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.
iii. The contractor should plant grass or any other vegetation cover to minimise exposed soil surface.
iv. Proper grading to promote sheet flow and minimize flow concentration on unconsolidated soil.
v. Directing flow to properly designated channels.

Increased water and soil pollution

i. 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.
ii. 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.
iii. The contractor should Plant vertiver grasses to minimize exposed soil surface area where necessary
iv. The use of silt fences and hay bales to remove suspended solids from surface water runoff

v. Silt curtains should be used to minimize sediment suspension and transport while working near water crossings.

Noise, Vibration and Air

i. 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.
ii. 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).
iii. 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.
iv. 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

i. Appropriate working gear (such as nose, ear mask and clothing) and good camp management provided.
ii. During construction, the contractor shall ensure that the campsite is fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, fire-fighting and clean and safe water supply. A health and safety management plan attached as **Appendix V** should be followed.
iii. A well-stocked First Aid kit (administered by first eider) maintained at the camp and each active work section.
iv. 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

i. The designs shall take account of safety concerns especially at human habitation crossings e.g., installation of bus stops at settlement centres.
ii. Awareness seminars shall be conducted during the construction and operation phases
iii. 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.
iv. The traffic management plans presented both in English and in Swahili.
v. Installation of speed control devices like humps
vi. All drivers (Contractor's) instructed to follow the minimum speed of 20 KPH at the work sites.
vii. Adequate signboards will be placed at the relevant location and flag man will be assigned whenever necessary.

Increased Waste Generation

i. Adequate number of waste bins shall be provided at the constructio sites site
ii. Only inert materials or readily decomposable materials shall be disposed by burial.
iii. No burning of waste materials which produces black smoke shall be approved. Plastics shall not be burned.
iv. No open burning of oils shall be done

v. The construction sites shall have adequate toilets with septic tank-soak away treatment system.
vi. Permits shall be obtained and NEMC guidelines and regualtions for hazardous wast management shall be followed for proper disposal of hazardous waste such as oils and greases as well as medical waste from first aids.

Loss of Vegetation

i. Close supervision of earthworks shall be observed in order to confine land clearance within the proposed new coridor of impact boundaries.
ii. 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.
iii. 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.

Labour and working Conditions

i. The project will develop Labour Management Procedures to guide the employment of all workers.
ii. Contractors will be required as part of the bidding documents to develop camp management plans and codes of conduct for workers,
iii. 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;
iv. All workers will have contracts with terms and conditions that are consistent with national labour laws and policies as well as ESS2.
v. Workers will have access to a specific worker grievance mechanism in line with ESS2, which will be documented in the LMP.
vi. 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.
vii. 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).
viii. 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.
ix. Selection of companies in the supply chain will involve due diligence to avoid the use of companies which are involved in child labour.
x. 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

i. 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;
ii. 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;
iii. Environmental sanitation systems shall be improved; and

iv. Medical facilities shall be increased at dispensary close to project areas so as to meet the population demand.
v. 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

i. A GBV Action Plan will be drafted, approved and implemented which will include the following:
ii. 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.
iii. Map out GBV prevention and response actors at the project level, and the City levels.
iv. 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.
v. 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.

6.10 Mitigation Measures for Operational Phase Impacts

Increased Road Accidents

i. Capacity building of Municipal polices (traffic) offices
ii. Installation of proper road signs and regular inspections for their presence
iii. Installation of speed control devices like humps
iv. Installation of pedestrian lanes at human settlement crossings

Increased noise, vibration and air pollution

i. Steep grades at critical locations shall be avoided so as to reduce noise from acceleration, braking and gear changes.
ii. Cut sections shall be used (where appropriate) to decrease noise in nearby residences.
iii. Speed limit and exhaust controls shall be enforced, especially in towns.
iv. Under good maintenance schedule, traffic exhaust emissions, will be intermittent and atmospheric dispersal of exhaust emissions will maintain the air quality. However, concerted effort to check engine performance is needed so as to deter vehicles not road-worth from using the roads.
V. 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.

Hazards related to waste deposition into storm water drains

i. IMC shall upgrade cleansing operations by, for example; the better placement and design of litter bins, more frequent collections of litter, monitoring street sweeping methods to ensure that litter is not swept into catch pits, and ensuring that communal collection depots are appropriately placed.

ii. To prevent litter into storm drains, IMC shall ensure that all water entrance points have screens and grid covers. Clearly, this can only be implemented together with a regular street sweeping service
iii. The municipal council is responsible for regular operation and maintenance of the roads and road drainage system.
iv. Existing or new bylaws shall be created to guide management of the drainage systems and waste deposition in general.
v. The municipal through the health/environment department shall ensure that waste deposited into drains is regularly removed.

Increase in risks for pollution of surface and ground water

i. IMC shall upgrade cleansing operations by, for example; the better placement and design of litter bins, more frequent collections of litter, monitoring street sweeping methods to ensure that litter is not swept into catch pits, and ensuring that communal collection depots are appropriately placed.
ii. To prevent litter into storm drains, IMC shall ensure that all water entrance points have screens and grid covers.
iii. Clearly, this can only be implemented together with a regular street sweeping service

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 be done by Ilemela Municipal Council with help from the Contractor, the Resident Engineer, some utilities provide such as MWAUWASA, TTCL and TANESCO, and the local communities at large. **Table 7.1** provides the ESMP for the proposed roads.

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 are also indicated in **Table 7.1.** 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. The supervisors engaged for at least 15 person-days a month over the entire construction period.

Table 7:1**:** Environmental and Social Management Plan (ESMP) for the Proposed Roads at Ilemela Municipal Council

Impact	**Mitigation measure**	**Responsible institution/Individuals**	**Mitigation Time frame**	**Annual Costs**	**Lump sum (Onetime costs) Costs**
Construction phase					
Destruction of other infrastructures	-TANESCO, MWAUWASA, TRL and TTCL shall be involved from the early stages of these projects so as to have an integrated planning. -Early notice shall be given to the community before any service interruption -The funds for the relocation of this infrastructure shall be part and parcel of the project.	Ilemela Municipal Council	Design and Construction		Provided in the BoQ (Series 1000)
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 must be carefully chosen to avoid erosion of arable land and creation of gullies. -The contractor should Plant vetiver grasses to minimise exposed soil surface. -Proper grading to promote sheet flow and minimize flow concentration on unconsolidated soil. -Directing flow to properly designated channels.	Ilemela Municipal Council	During Design and Construction	Provided in the BoQ (SS 1704)	

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs
Noise pollution	-Provide working gear to workers -All noisy works shall be restricted during day time only -Proper choice of equipment which offer environmental advantages	Ilemela Municipal Council	Construction	Provided in the BoQ (SS 1709)	
Air pollution	-Watering road section (near human habitation) -Proper choice of equipment which offer environmental advantages	Ilemela Municipal Council	Construction	Provided in the BoQ (SS 1708)	
Vibration	-Advance notice to local communities	Ilemela Municipal Council	Construction		
Safety and health risks	-Appropriate working gear (such as nose, ear mask and clothing) and good camp management shall be provided. -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 **Appendix V** of this ESIA.	Ilemela Municipal Council	Construction Phase	Provided in the BoQ	

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs
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 techniques and safe tipping operation shall be imparted to all drivers before allotting vehicles to them. -Over speeding shall not be allowed at any case and if observed do so disciplinary actions shall be taken against the defaulter. Maximum speed shalll be limited to 40km/hr. -Nobody is allowed to drive if under the influence of alcohol or drugs. -Beware signage shall be established on public institutions' entrances	Ilemela Municipal Council	Design stage and Construction Phase		
Increased Waste	-Vegetations (Trees, Grasses) and remnants of timber shall be given to residents near the project roads to be used as Source of energy.	Ilemela Municipal Council	Construction Phase	Provided in the BoQ (SS1712)	

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs
	-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 -Top soil shall be used as backfilling material in the borrow pits, fill the diversions. -Plastics and Scrap Metals shall be sold to certified recyclers -Tins Glasses and other inert materials Taken to the Authorized dumpsite -Sewage shall be directed Septic tank – Soak away system at the camp site/office and mobile toilets along the route.				
Loss of Scenic Quality	-The topsoil shall be stock piled for later use in reinstating the pit. -Sand and Gravel shall be sourced from the approved Sand mines and Quarries (Which have mining license)	Ilemela Municipal Council	During Mobilization, Construction and after construction	Provided in the BoQ (SS 1703)	
Loss of Vegetation	-Close supervision of earthworks shall be observed in order to confine land clearance within the proposed new corridor of impact boundaries. -The contractor shall replant trees and grasses along the roads where possible. -Topsoil shall be stockpiled and used for reinstating flora along the road. It is assumed that displaced fauna will return	Ilemela Municipal Council	During Construction	Provided in the BoQ (SS1705 and SS5700)	

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs
	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. -Trees and Crops to be removed shall be compensated				
		Operation phase			
Interference to local hydrology	-The design shall utilize as much as possible the existing channels -Where possible, the designs shall leave enough unpaved space alongside the road for water to seep into the ground -The design will provide controlled and effective storm water dispersion by installation of adequate and appropriate drainage structures. -The discharge points shall be well designed to avoid accelerate erosion downstream.	Ilemela Municipal Council	Design Stage	N/A	
Increased Road accidents	-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.	Ilemela Municipal Council	Operation phase		

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs
	-Capacity building of Municipal polices (traffic) offices -Installation of proper road signs (in Swahili Language) and regular inspections for their presence -Installation of speed control devices like humps -Installation of pedestrian lanes at human settlement crossings				
Decommissioning Phase					
Increased noise and vibrations	-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.	Ilemela Municipal Council	Decommissioning Phase		
Increased dust levels	-Water sprinkling shall be applied to open earth to reduce dust emission;	Ilemela Municipal Council	Decommissioning Phase		

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs
	-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	-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.	Ilemela Municipal Council	Decommissioning Phase		
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.	Ilemela Municipal Council	Decommissioning Phase		

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs
	-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.				
Total Cost					**145,000,000**

7.3 Implementation of the ESMP

To facilitate effective implementation of the ESMPs, the Ilemela Municipal Council-Environmental and social officers will:

(a) be responsible for ensuring the timely implementation of the ESMP, including monitoring, reporting, and capacity building related to safeguards;

(b) assign the Construction Supervision Consultant (CSC) to be responsible for supervision of the contractor's safeguard performance as part of the construction contract and this requirement will be included in the CSC terms of reference (TOR); and

(c) Hire qualified national consultants as the Independent Environmental Management Consultant (IEMC) to assist in performing these tasks.

Ilemela Municipal Council will be responsible for implementing the mitigation measures during the operation stage of the project; It will ensure that the mitigation measures are implemented and adequate budgets are provided. Ilemela Municipal Council will provide the overall policy guidance and oversight for project implementation, including the ESMP. More details on organization, roles and responsibilities for the ESMP implementation and the monitoring program are described further below.

7.4 Role and Responsibilities for ESMP Implementation

Ilemela Municipal Council shall be responsible for ESMP implementation; the Project Coordinator (PC-Ilemela Municipal Council) will have a quality assurance and monitoring role including all safeguards aspects (**Table 7.2**).

Ilemela Municipal Council will also be responsible for contracting and managing the Independent Environmental Monitoring Consultant (IEMC) who will monitor the environmental performance of the project. The IEMC's costs are therefore part of the budget, and not do not form part of the ESMP implementation costs. The figure and subsequent table below summarize the roles and responsibilities of the key parties and their relationships with regard to the implementation of the ESMP.

Contractors have the main responsibility for implementing mitigation measures. Those measures will be included in the bidding documents and the costs are to be included in their bids and the construction contracts.

CSC is responsible for supervising and monitoring the day-to-day implementation of mitigation measures. The associated costs are included in CSC service contracts. IEMC will be responsible for environmental monitoring which includes (i) support to the Municipal environmental and social officers for implementing supervision and monitoring, and (ii) reporting on the implementation through periodic monitoring reports.

Table 7:2**:** Role and Responsibilities of Key Parties for ESMP Implementation

Organ	Roles and Responsibilities
-IMC - Environmental and social officers	-Responsible for implementing the ESMP during the detailed design and construction stages. ESMP implementation during operation stage is the responsibility of the Environmental and social officers to ensure timely and effective implementation of the ESMP, including preparation of reports on safeguard compliance as required by Government and WB.

Organ	Roles and Responsibilities
	–Responsible for ensuring that the relevant sections in the bidding and contract documents for all construction works are in compliance with the ESMP; this means they contain the requirements of the ECOPs and site-specific ESMPs.
	–Responsible for communicating with relevant local, regional and national departments; and with the agencies responsible for implementing and supervising ESMP, especially with the National Environmental Management Council (NEMC), and with the concerned wards/subwards during planning, monitoring, management and operation.
	–Will coordinate with community organizations to encourage them to actively participate in the planning, management, and implementation of the project, including monitoring of the contractor's performance.
	–To ensure effective monitoring and timely implementation of the ESMP, Ilemela Municipal Council- Environmental and social officers will hire national environmental consultants to assist them with carrying out and monitoring the ESMP implementation.
	–In the course of supervising and monitoring the contractors' performance, - Environmental and social officers will be responsible for: (a) checking project implementation indicators relating to the environment; (b) conducting unscheduled, surprise inspections to ensure that mitigation measures are being implemented as required in construction contract by contractor; (c) reviewing the periodic reports of the Construction Supervision Consultant (CSC) to ensure compliance with mitigation measures and ESMPs; and (d) based on the periodic reports by CSC and IEMC, preparation of reports on environmental compliance of subprojects, to be submitted to and NEMC (this will be part of the submission of progress report in every six months).
	–Coordinate closely with relevant bodies for water supply (MWAUWASA), environmental sanitation, and solid waste collection, to monitor their operation and maintenance activities during project implementation.
Construction Supervision Consultant (CSC)	-Responsible for monitoring the safeguard performance of the contractors during site clearance and construction, including oversight of the self-monitoring to be conducted by contractor. With regard to environmental safeguards, the CSC's main responsibility will include, but not be limited to, the following:
	–Assist IEMC to establish, collect and provide information essential environmental indicators, on-site and for the construction works.
	–Ensure that all work comply with the approved ESMPs, as set out in documents for environmental impact mitigation and monitoring.
	–Monitor the implementation of mitigation measures by the contractors, propose and deploy any necessary supplementary measures in time to improve mitigation measures to fully meet the environmental management and safety requirements of project.

Organ	Roles and Responsibilities
	–Prepare action plans and/or propose urgent solutions to cope with environmental problems, emergency situations and damage that occurred during construction
	–Recommend to Environmental and social officers to suspend partially or completely construction work if labor safety and environmental protection requirements of the contract are not being complied with.
	– Organize regular discussions with relevant parties, agencies and other stakeholders to provide information about implementation plans to increase people's awareness of the need for environmental protection and management during construction process.
Construction Contractor	Responsibilities with respect to all aspects of the works, including the environmental aspects, are set out in the contract documents, signed with the Environmental and social officers.
	– Construction contractors are responsible for carrying out environmental impact mitigation measures and for complying with the approved ESMP when implementing construction contracts. When preparing the "Contractors ESMP", the contractor will study the project's approved EIA report and propose a construction method that includes environmental mitigation and monitoring measures that are in line with the approved ESMP.
	–Contractor's ESMP will be submitted to Environmental and social officers and CSC for review, as well as to IEMC, as deemed necessary. Changes, if any, will be evaluated for their feasibility and for legal issues (laws, decrees, circulars and other regulations) before suitable adjustments are approved for specific cases on-site.
	–During the construction work, the construction contractors will be closely supervised by IMC - Environmental and social officers, CSC and the local community for their compliance with the ESMP.
Independent Environmental Monitoring Consultant (IEMC*)*	The IEMC will be responsible for assisting the Ilemela Municipal Council with the ESMP implementation. This also includes advising the CSC, contractors and communities on environmental compliance, and on carrying out the monitoring program in accordance with regulations, procedures and policies of the Government and the WB, respectively. After the detailed implementation of the environmental monitoring programs was discussed by the Ilemela Municipal Council- Environmental and social officers and World Bank supervision staff, the IEMC will be responsible for quarterly checking, and for supporting the Ilemela Municipal Council- Environmental and social officers to supervise overall project activities to ensure that uniform environmental policies of the Government and World Bank are applied and supervised during project implementation. The IEMC will be responsible for: (1) providing training and capacity building for construction management Ilemela Municipal Council- Environmental and social officers, including field engineers and/or consultants (CSC), in supervising the ESMP implementation by the contractors; (2) ensuring active participation of the

Organ	Roles and Responsibilities
	local communities and schools in the project areas, (3) monitoring of environmental parameters to assess the overall impacts of the project, and (4) establish the environmental training program
	–Ensuring that the approved ESMP and all other relevant project legal agreements related to environmental safeguards are fully applied and complied with during project implementation.
	– Assessing the effectiveness of mitigation measures which are applied by contractors and CSC during project implementation; providing proposals and recommendations to the Ilemela Municipal Council- Environmental and social officers on improvements needed to meet the safeguard requirements.
	–Reporting periodically (every 3 months) to the Ilemela Municipal Council- Environmental and social officers on actual ESMP performance during project implementation.
	–Establishing standard procedures, methods and forms to assist the Ilemela Municipal Council- Environmental and social officers and CSC to assess contractors' progress in implementing the required impact mitigation and monitoring measures.
	–Assisting the Ilemela Municipal Council- Environmental and social officers to review and check that relevant environmental sections (based on the ESMP) have been included in the bid packages and construction contract documents to ensure compliance with environmental policies and impact mitigation and monitoring requirements.
	–Measuring, taking samples and monitoring periodically the key environmental parameters, i.e., once every 3 months.
	–Assistance with the preparation of documents and implementation of training programs in environmental monitoring and supervision for contractors, CSC and relevant staff of the Ilemela Municipal Council- Environmental and social officers
	–Via Ilemela Municipal Council- Environmental and social officers, discussing with relevant enterprises, as necessary, to find suitable solutions for unexpected risks relating to environmental sanitation.

7.5 Institutional Arrangements and Reporting Procedures

Ilemela Municipal Council- Environmental and social officers 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 Ilemela Municipal Council. Ilemela Municipal Council-Environmental and social officers 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.

7.6 Capacity Building Program

Ilemela Municipal Council have one Environmental Officer under the Department of Land and Natural resource and a community development officer. The two will provide technical assistance that will support Ilemela Municipal Council during the implementation of the ESMP. The environmental and social officers will provide the necessary support to Ilemela Municipal Council in its work with contractors as well as other entities involved in the implementation of the ESMP.

The training 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 Ilemela Municipal Council to do their tasks. It will also include assisting Ilemela Municipal Council environmental and social staff with the review of contract documents to ensure compliance with the ESMP. It will also provide general environmental guidance as requested by Ilemela Municipal Council to enhance overall project implementation and performance.

Proposed Training Programs

The **Table 7.3** provides examples of the basic training programs for safeguards during project implementation. The training programs developed and delivered by the environmental and social officers in collaboration with the PORALG and the World Bank for the implementation of safeguards for the Ilemela Municipal Council training. The Ilemela Municipal Council trained staff will provide the training to contractors and other entities concerned.

Other more specific and tailored training will be developed and agreed upon 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:* Ilemela Municipal 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 Ilemela Municipal 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 7:3**:** Training Programs for Capacity Building in Environmental Supervision and Management

Target Group	**Ilemela Municipal Council Staff**
Course Title	Environmental supervision, monitoring and reporting
Participants	Environmental and social officers and technical staff (Project Coordinator, 20 Ilemela Municipal 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 a yearly basis until year three of implementation.
Content	• General environmental management relating to the project, and covering the requirements • General aspects of environmental supervision; • Implementation and supervision of mitigation measures; • Community participation in environmental supervision monitoring. • Guidance and supervision of contractors, Subcontractors and community representatives in the implementation of environmental supervision. • Use of forms for environmental supervision;

	• Risk response and control; • Receipt and submission of reporting forms • Other areas of training needs, as determined
Responsibilities	Ilemela Municipal Council with support of the environmental and social officers for the implementation of safeguards.
Target Groups	**Contractors, Subcontractors, Ward Authorities, Community Representatives**
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	-Overview of environmental monitoring; -Requirements of environmental monitoring; -Role and responsibilities of contractors -Scope and methods of environmental monitoring; -Response and risk control; -Propagate monitoring forms and guide how to fill in the forms and risk report; -Preparation and submission of reports -Other areas to be determined.
Responsibilities	Ilemela Municipal Council with support of the Environmental and social officers for the implementation of safeguards issues
Target Groups	**Communities and Workers**
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	-Detailed presentation on environmental protection and environmental overview -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.) -Management of environmental safety and sanitation on work sites; -Mitigation measures at construction sites; -Safety measures on electricity, mechanical, transportation, air pollution;

	-Procedures to deal with emergency situations; -Other areas to be determined.
Responsibilities	Contractor and Ilemela Municipal Council

CHAPTER EIGHT

ENVIRONMENTAL AND SOCIAL MONITORIG 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 EIA 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 8.1**). Ilemela Municipal Council is responsible for monitoring activities laid out in the ESMP. However, the divisional/ward/village environmental committees and the supervisory consultant 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 8:1**:** Environmental and Social Monitoring Plan for the Proposed Roads in Ilemela Municipal Council

Parameters		**Monitoring frequency**	**Sampling Area**	**Measurement Units**	**Method**	**Target level/ Standard**	**Responsibility for monitoring**	**Annual costs estimates (TSH)**
Pre construction stage								
Air quality	Dust	Once before the construction starts	At the start, Middle and end of all project roads	µg/m^3	*Micro Dust Pro*	<0.01	Ilemela Municipal Council	9,5000,000
Noise Baseline	Noise level	Once before the construction starts	At the start, Middle and end of all project roads	dBA	Noise Level Meter	<110	Ilemela Municipal Council	8,500,000
Water Quality	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	Ilemela Municipal Council	7,500,000
Construction stage								
Air pollution	Dust	Once Per Month	At the start, Middle and end of all project roads	µg/m^3	*Micro Dust Pro*	<0.01	Ilemela Municipal Council	8,000,000
Noise pollution	Noise level	Once Per Month	At the start, Middle and end of all	dBA	Measurements	<110	Ilemela Municipal Council	8,500,000

Parameters		Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (TSH)
			project roads					
Water Quality	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	Ilemela Municipal Council	7,000,000
Soil erosion	Soil erision along the road	Once in three Months	Project roads	Level of erosions	Site inspection	_	Ilemela Municipal Council	9,000,000
Vegetation	Biomass	Once in three month for construction period	Trees along the road	-	Inspection	-	Ilemela Municipal Council	9,500,000
Vibration	Vibration levels	Once per Month	Project road	No per time	Records	-	Ilemela Municipal Council	9,000,000
Frequency of illness of construction workers	Illness of construction workers	Once in a month for the construction period	Project site	Number of cases	Health records	-	Ilemela Municipal Council	9,000,000
Employment opportunity	Percentage of local construction labourers	Three times a year	Project site	Number of local people employed	Records, inquiries and observation	-	Ilemela Municipal Council	7,000,000

Parameters		Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (TSH)
				in the project				
Safety and health risks	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 injuiries and illness statistics	-	Ilemela Municipal Council	9,000,000
Dust Suppression	Water sprinkling	Everyday	Project site	Frequency of water sprinkling	Inquiries and observation	Minimum dust emission	Ilemela Municipal Council	9,500,000
Operation stage								
Safety of human beings	Road accidents and roads signs	Three times a year for the project life span	Project site	Road signs and number of accidents	Records, inquiries and illness statistics	Zero accident and sufficient no of road signs	Ilemela Municipal Council	7,000,000
Total monitoring costs								**84,500,000**

8.3 Grievance Redress Mechanisms

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. GRM provide a formal avenue for affected groups or stakeholders to engage with the project on issues of concern or unaddressed impacts. In order to make this aim a reality, Ilemela Municipal Council will strengthen the existing grievances handling mechanisms and procedures to address grievances associated with the construction of the market and roads under TACTIC project in Ilemela Municipal Council to include grievances related to PAP and contractor's grievances.

The proposed grievances officers at Ilemela Municipal Council comprise of project implementing team members lead by both Environmental and Social officers with the assistances of project coordinator as well as the Legal Counsel/Officer of the Municipality. However, the Municipal Director has a mandate and jurisdiction to decide otherwise on the team composition or appoint new team when deemed fit and necessary to do so.

8.3.1 Grievances Redress Procedures

The project will establish or strengthen the GRM mechanism at the Ilemela Municipal Council which will be adopted by the contractor undertaking the construction of roads. This is the response to one of the concerns raised during stakeholder consultation.

8.3.2 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.

8.3.3 Principles

A functional GRM has to be established and/or strengthened at Ilemela Municipal Council in order to ensure grievances emanating from the project implementation activities 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.

8.3.4 Construction GRM

This will be administered by the contractors and will address grievances associated with the construction of the bus terminal.

Step 1: 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/ institution; and
- email, what's app messages and telephone (where appropriate).
- 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. Once a grievance has been received it must first be logged in the grievance database register by the CGC. A sample grievance logging form should be provided. 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 compliant 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 by the Ilemela Municipal Council project implementing level or PIU at PORALG, the complainant will be advised of their right to legal recourse.

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 Ilemela Municipal 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 Ilemela Municipal Council
-Reduced traffic congestion
-Increase property value
-Change community livelihood

9.1.2 Costs related to the project

The construction of the project estimated to cost over **5.7 billion (Five billion and 7 million)** Tanzanian Shillings. The estimated costs for implementing impact management **TSH 145,000,000** while that for monitoring process is about **TSH 84,500,000 (Eighty-Four Million Five Hundred Thousand Only)** 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. The project will be funded by United Republic of Tanzania under TACTIC project financed by the World Bank.

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 Deccommissioning 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 Ilemela Municipal 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. 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 shadecloth 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 deccommissioning 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 Ocupational 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. A generic Health and Safety Management is Attached in this report as **Appendix IV.**

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.

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 deccommissioning is estimated to be **90,000,000 TSH.**

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

The EIA 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 Ilemela Muncipal 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.

11.2 Conclusions

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. Ilemela Municipal Council is committed in implementing all the recommendations given in the EIS and further carrying out the environmental auditing and monitoring schedules.

11.3 Recommendations

- Ilemela Municipal Council should allow the construction of the proposed roads because it has no detrimental impacts to environment or Social once mitigation measures proposed are to be implemented.

- Ilemela Municipal Council must abide to the Mitigation measures to combat impacts Identified in this report.

- Contractor must abide safety & 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 Statement for the Proposed Upgrading of Buswelu - Busenga - Coca Cola Road/Musoma Road at Igoma and Buswelu-Nyamadoke-Nyamhongolo Roads at Ilemela Municipality in 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 impact Assessment (EIA) for the upgrading of Buswelu - Busenga - Coca Cola Road/Musoma Road at Igoma and Buswelu-Nyamadoke-Nyamhongolo Roads. The EIA 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 EIA Registration form and prepare project brief. The filled EIA 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, equipment 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 rod 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.

Policies, Regulations and Guidelines	**Legislation**
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) **Regulations, Strategies and Guidelines:** 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)	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)

Apart from country policies and legislation the World Bank Environmental and Social Framework (ESF) which describes ten (10) 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.

Furthermore, the consultant shall clearly describe the linkage between the functions of the relevant Institutional or administrative frameworks in Tanzania and the proposed project undertakings;

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 district/town/municipal 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 EIA 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 indicting 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:

- Ilemela Municipal Council
- Local Governments in the project area (Ward and mtaa leaders)
- National Environment Management Council (NEMC)-Zonal Office
- Local Communities
- TANESCO and MWAUWASA

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 sitting, 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 analyse 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 (ESMP)

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.

ESMP 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, EIA 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/2022/9887** **Date: 08/06/2022**

ILEMELA MUNICIPAL COUNCIL,
P. O. Box 735,
ILEMELA

RE: SCOPING REPORT AND TERMS OF REFERENCE (ToR) FOR PROPOSED UPGRADING OF BUSWELU-BUSENGA-COCA COLA ROAD/MUSOMA ROAD AT IGOMA AND BUSWELU-NYAMADOKE-NYAMHONGOLO ROADS LOCATED AT BUSWELU AND NYAMHONGOLO WARDS, ILEMELA DISTRICT 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 requirements of ESIA and Audit Regulations, 2005 specifically Regulation 51 and 52. Furthermore the following should also be included in the ESIA report: -

i. All key stakeholders are consulted including neighbors 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 **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;
v. On the cover page, the Council requests you to distance to be covered by the proposed project;

All correspondence should be addressed to the Director General

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 review, representatives of the AC will visit the project area to inspect the site and verify adequacy of the ESIA Report. As you submit the ESIA report you will be required to as well pay to the Council review cost through a control number to be generated by the system.

5. We look forward to your cooperation on this matter.

A. N. Sembeka
***For*: Director General**

Cc: DAR AL HANSADAH

All correspondence should be addressed to the Director General

Appendix III: List of Stakeholders Consulted

ORODHA YA WADAU WALIOSHIRIKI KATIKA MAJADILIANO KUHUSU UJENZI NA UBORESHAJI WA MIUNDOMBINU WILAYANI ILEMELA

STAKEHOLDERS CONSULTATION FOR THE PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT, STAKEHOLDER ENGAGEMENT PLAN, RESETTLEMENT ACTION PLAN AND DESIGN DRAWINGS OF THE PROPOSED INFRASTRUCTURE CONSTRUCTION IN ILEMELA MUNICIPAL COUNCIL

TAREHE NA MUDA / DATE AND TIME: 14/1/2022 / **SIKU/DAY:** FRIDAY

NYAMHONGOLO WARD **PARTICIPANTS LIST**

No	Jina / Name	Cheo / Position	Namba ya Simu / Tel. Number	Anuani ya barua pepe / Email Address	Sahihi / Signature
1	ANDREA A. NGINILA	DIWANI	0752823284	S.L.P 735	
2	SAFIA M. MKAMA	DIV/MAALUM	0752296765	SLP 735	
3	DAUDI Cr. LUMAZI	KAT MTENDAJI	0767469261	735 MZA	
4	ADAM R. MASUNGA	M/KITI-MTAKUJA	0763752540	SLP 735 MZA	
5	MILEMBE J. LUGIKO	MTENDAJI IBINZA	0758744170	S.LP 735	
6	MICHAEL NYANDA	M/KITI ILAMBATA	0755063784	S.LP 735	
7	MUSSA MANYILIZU	M/KITI NYAMADOKE	0756781708	SLP 735-	
8	NKUBA CHARLES	MEO-KAT A	0783655334	SLP 735	
9	Judith M. Msaze	FSO	0786649267	SLP 735	

Nyamadoke – Nyamhongolo Road 9.5km

MTENDAJI WA KATA
KATA YA NYAMHONGOLO
MANISPAA YA ILEMELA
S.L.P. 735 MWANZA

NYAMHONGOLO WARD

10	BONIPHACE M. NKINGWA	MTENDAJI IWELYASHINGA	0765577182	S.L.P 735	
11	OSCAR S. NDUNGURU	MEO NYAMADOKE	0753280347	SLP 735	
12	SAMUEL JOHN	M/kiti mtaa Ilambata	0769065950	CLP 735	
13	Leonfrey Bigambo	SLFE	0768284276	S.L.P. 735	
14	PAUL JAMES MATENDO	M/KITI IBINZA	0754386611	SLP 735	
15	EMMANUEL S. MASESA	M/KITI NYAMHONGOLO	0763206050	SLP 735	
16	SELEMANI MABINA	M/KITI – KAGEHEWA	0753761982	SLP 735	
17	PETER ZUNGA	M/KITI - NYAMITONGOLA	0764694212	SLP 735	
18	JUMANNE MASESA	Social Focal Person	0756960106	jumannemasesa@gmail.com	
19	THOMAS B. MARCO	EMO-ILEMELA MC	0755248479	marcon1123@yahoo.com	

MTENDAJI WA KATA
KATA YA NYAMHONGOLO
MANISPAA YA ILEMELA
S.L.P. 735 MWANZA

ORODHA YA WADAU WALIOSHIRIKI KATIKA MAJADILIANO KUHUSU UJENZI NA UBORESHAJI WA MIUNDOMBINU WILAYANI ILEMELA

STAKEHOLDERS CONSULTATION FOR THE PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT, STAKEHOLDER ENGAGEMENT PLAN, RESETTLEMENT ACTION PLAN AND DESIGN DRAWINGS OF THE PROPOSED INFRASTRUCTURE CONSTRUCTION IN ILEMELA MUNICIPAL COUNCIL

TAREHE NA MUDA / DATE AND TIME: 14/01/2022 / 10:05 **SIKU/DAY:** FRIDAY

BUSWELU WARD

Buswelu - Buzuruga - Igoma cake cola Road 3.3km

PARTICIPANTS LIST

No	Jina / Name	Cheo / Position	Namba ya Simu / Tel. Number	Anuani ya barua pepe / Email Address	Sahihi / Signature
01	SARAH PAUL NGHWANI	DIWANI-KATA	0764995992		
02	WINIFRIDA ELIA GYUNDA	DIWANI/NAALUM	0754881632		
03	MAARUFU A. MOHAMED	WEO - BUSWELU	0757341223	maarufuamri@gmail.com	
04	SILVESTER CLEMENT	MKUU-BUJIN LIWA	0755335075		
05	SHAKIRA MHAGAMA	MKUU-BUZURUGA	0784572121		
06	JOSEPH B. MASUNGA	M/KITI-BULOBA B	0764506756		
07	HAMIS MAGAWILA	MKITI - KIGALA	0764094403	magawilahs@yahoo.com	
08	SARAH TEMBA	MEO	0769646464		
09	DANIEL C. KAGARUKI	MTKITI MAJENGO	0767-251890	P.O.Box 1003 MZA	

WEO BUSWELU

14/01/2022

AFISA MTENDAJI KATA YA BUSWELI S.L.P 735 MWANZA

BUSWELU WARD

NO					
10	MGETA F. BULUMBA	MKUU BUSWELU	0764828854		
11	ELIAS MALIPESA	M/KITI BULOBA 'A'	0758016666		
12	MAFRIDA MWANJISI	M/KITI BUSWELU 'B'	0742134100		
13	DAMIAN M MAPA	MEO/BULOBA MUHN	0767878651		
14	LINDA JOHN	MEO/Najitolea	0744613669	lindajaphet@gmail.com	
15	JUMA HABIBU	MEO	0767959358		
16	FIDELIS KIRARYO	CDO	0736074455		
17	AUGUSTINO M. JULIUS	MEO/ZEMBWELA	0744436696		
18	JUMANNE MASEKE	Social Focal Person	0756960106	jumannemaseke@gmail.com	
19	JUMA JOHN OWINO	M/Kiti Zembwela	0785422222	Juniowinos@gmail.com	
20	YOHANA L. CHINAMA	AFISA AFYA	0625521017	yohanachinamagegam.com	
21	PHINEAS B. MARCON	Environmental Officer	0755248479	marcon1123bwiro@gmail.com	

BUSWELU

AFISA MTENDAJI KATA YA BUSWELI S.L.P 735 MWANZA

TAR. 14/01/2022

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 UPGRADING OF BUSWELU - BUSENGA - COCA COLA ROAD/MUSOMA ROAD AT IGOMA AND BUSWELU-NYAMADOKE-NYAMHONGOLO ROADS LOCATED AT BUSWELU AND NYAMHONGOLO WARDS, ILEMELA MUNICIPALITY IN MWANZA REGION

TAREHE NA MUDA/ DATE AND TIME: 28/02/2022 SIKU/DAY Wednesday

LIST OF STAKEHOLDERS

S/N	Jina/ Name	Taasisi/ Institution	Cheo/ Position	Namba ya Simu/ Phone No.	Anuani ya barua pepe/ email address	Sahihi/ Signature
1.	Eng. Salim Lossindela	MWAUWASA	DWSS	0756291529	salim.lossindila @mwauwasa.go.tz	[signature]
2.	Renatus Shinhu	LVBWB	Basin Water Director	0752220142	renatus.shinhu@lvbwb.go.tz	[signature]
3.	Baruli seif	LVBWB	CDO	0755 443696	baruliseif2013@gmail.com	[signature]
4	Eng. Abdallah Mitenda	TANESCO	Ag. RM	0714583007	abdallah.mitenda@tanesco.co.tz	[signature]
5	Bakari Salim Mohamed	Tanzania Forest Services Agency (TFS)	Zonal Manager	0787720566	bakari.mohamed @tfs.go.tz	[signature]
6.	THOMAS MOSHI	TFS	Asst. Zonal Manager	0754436616	thomasmoshi@yahoo.co.uk	[signature]

Appendix IV: Minutes of Meeting

14/01/2022.

HALMASHAURI YA MANISPAA YA ILEMELA

MUHTASARI WA KIKAO CHA WADAU KUHUSU ATHARI ZA KIMAZINGIRA NA JAMII KATA YA NYAMHONGOLO KATIKA MRADI WA MABORESHO YA MIUNDOMBINU KUENDANA NA KASI YA UKUAJI JIJI LA MWANZA.

AJENDA

1 KUFUNGUA KIKAO
2 MAELEZO KUHUSU MRADI
3 MASWALI NA MAONI KUTOKA KWA WADAU
4 KUAHIRISHA KIKAO

1. => KUFUNGUA KIKAO

M/kiti ambae ni MH. Diwani alifungua kikao mnamo Saa 05:30 Asubuhi nakuwaomba wadau wa kikao kuweza kuzichangia kwa umakini ajenda zilizopo mezani na kujitambulisha ili kuweza kuendelea na kikao.

2. MAELEZO KUHUSU MRADI

Mwezeshaji alitolea ufafanuzi juu ya ujio wao katika kata ya Nyamhongolo na kuwaeleza wadau kwamba Tumekuja kwenu wana Nyamhongolo kuzungumzia juu ya mradi wa barabara ya ~~Ay~~ Buswelu, Nyamadoke kwenda Nyamhongolo yenye urefu wa km 9.5 na kuchukua maoni kutoka kwa wananchi juu ya mradi huu na Dar Alhandas ndiye mkandarasi wa ujenzi huu. mfano tunahitaji barabara iwe na mataa hamsini, au mitaro ya aina Flani au barabara iwe namna Flani n.k. Kikubwa ni maoni yenu tuu wadau.

3. => MASWALI NA MAONI KUTOKA KWA WADAU.

Mjumbe je hizi nyumba ambazo zipo katika barabara wamelipwa wahusika na mtaa wa mtakuja na kashishi kuna majaruba Sana je pale barabara itapita vipi.

Mjumbe kwanza nashukuru maafisa kutoka Manispaa ya Ilemela na pendekezo, wakati wa utengenezaji wa barabara pazingatiwe uhalisia ya kama Shule, Senta na je urefu na upana tujue mapema

1–4

Wajumbe wa kikao kikuu walimkubali mradi na kuona kama umechelewa sana na kuomba vituo visiwekwe mbali sana na maeneo makuu wanayoishi wananchi na kuzidi kushirikishwa mradi utakapo kua ukiendelea, na ni vyema tukatumia vituo vya boda boda kutumika kama vituo vikuu vya barabara

Mjumbe naomba mradi utakapoanza ntuangalie wananchi kwanza wa kata yetu husika ya Nyamhongolo, vijana wetu wapate ajira kwanza katika mradi huu haswa katika kazi ambazo haziitaji utaalamu sana

Kuzibaini sehemu korofi wenye viti tunajua vyema kama sehemu inakua korofi kuibainisha mapema -

* Muwezeshaji majibu

Mradi huu utakuja ikiwa ni kutokana na mkopo kutoka nje hivyo swala la kuwekwa taa nila lazima katika barabara hii, na swala lakulipwa fidia kama eneo lita kua limepimwa naamini halmashauri ndiyo wanaoweza kulipa fidia hiyo.

- Pia tuangalie sana wananchi wasije pandikiza vitu au kujenga kwa muda huu ili wasije pata hasara na ukubwa wa barabara upana utakua ni mita 20 tu kwa mradi huu wa kimkakati unaoitwa TAKTIKS na kama tutahitaji kuongeza ni hapo badae.

- Pia tutahakikisha tunawashirikisha sana katika swala hili haswa ujenzi wa mitaro.

- Pia tusijalibu kutengeneza mgogora ndugu zangu kwani mradi utahamishwa mf mgogoro wa mtu kusema ntiwang katani labda kama ni nyumba hivyo hata maswala ya makaburi kwahiyo tujitahidi kupunguza migogoro

- Kuhusu swala la vituo tutazidi kuitana sana ili kupata maoni ya wananchi kwani hiki ni kikao cha awali tu ndugu zangu tutaitana vikao vingi vya majadiliano

- Ajira kwa wazawa naamini ni kunasheria inayoongoza kupewa kipaombele kwa wenyeji wa sehemu husika japo muda mwingine huwa wanadai kuibiwa na wazawa hivyo tukawajenge vijana wetu wasije kua tofauti. mradi utakapoanza.

2-4

M/kiti wa Nyamadoke aliwaomba wa wezeshaji kuangalia kisima cha asili kilichopo mtaa wa Nyamadoke maana kinatusaidia Sana Sana.

4. KUAIRISHA KIKAO

M/kiti / MH. Diwani alisimama na kuwashukuru wajumbe wa Kikao kwa mualiko wao mzuri na kuwashukuru wawezeshaji waliofika na kuahirisha Kikao mnamo Saa 07:20 Mchana.

MWENYEKITI

KATIBU.

MTENDAJI WA KATA
KATA YA NYAMHONGOLO
MANISPAA YA ILEMELA
S.L.P. 735 MWANZA

Appendix V: 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.

Ilemela Municipal Council (IMC) is among the four (4) beneficiary LGAs under TACTIC Tier 1. Among the three sub-investments projects the council plans to implement is the construction of Buswelu – Busenga – Coca-Cola Road (3.3km) to bitumen standard; and construction of Buswelu – Nyamadoke – Mnyamhongolo road (9.5km) to bitumen standard. This Resettlement Action Plan is prepared to address relocation impacts associated with the construction of the Buswelu – Nyamadoke – Mnyamhongolo road (9.5km). 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:

a. The Construction of Buswelu – Nyamadoke – Mnyamhongolo Road in Ilemela Municipal Council (9.5km) to Bitumen Standards aims to improve road transportation and further stimulate industrial activities; ensure reliable provision of quality industrial goods and services; increase investment opportunities, create employment, and expand business activities hence improved standards of living and the Gross Domestic Product (GDP).
b. The construction of Buswelu – Busenga - Coca Cola Road (3.3km) to Bitumen Standards aims to reduce traffic congestion in Mwanza City, thus saving traveling time and cost.

1.2 Description of the Proposed Sub-investments in the Ilemela Municipal Council

1.2.1 Project Location and Sites

a) Construction of Buswelu – Nyamadoke – Mnyamhongolo Road in Ilemela Municipal Council (9.5km) to Bitumen Standards

This is a new road network which connect new Bus Terminal and Ilemela Municipal Head quarter (Figure 1).

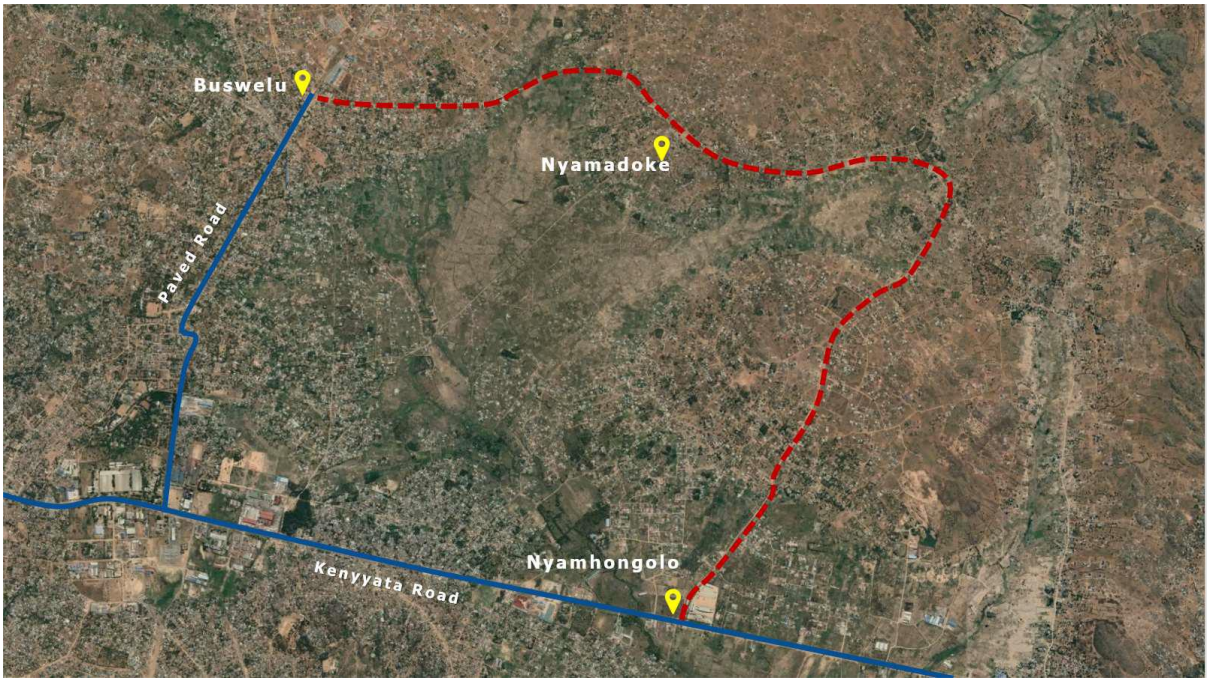


Figure 2 : Proposed Buswelu-Nyamadoke-Nyamhongolo Road

Source: Location map by Dar Al-Handasah (March 2022)

1.3 Rationale and Objective of the RAP

The proposed construction of Buswelu-Nyamadoke-Nyamhongolo Road (9.5km) to bitumen standard will involve permanent land acquisition in some areas which are legally owned by private individuals. A total of 82 PAPs will be affected in Ilemela Municipal council. Preparation of RAP is done to ensure that, the project sub investments comply with the national laws and the World Bank Environmental and Social Framework Standards (ESS5). Specifically, this RAP is meant to address the following objectives:

- 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 RAP process;
- Define the monitoring and evaluation arrangements including Grievance Redress Mechanisms (GRM);
- Define the institutional and implementation arrangements to effect RAP and temporary relocation of traders.

Consequently, the aforementioned objectives define the scope of this RAP and Temporary Relocation Plan (TRP).

2. RAP 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 and it captures two dimensions.

- Resettlement Action Plan which addresses economic and physical displacement of individual assets along the Buswelu –Nyamadoke –Nyamhongolo road; and

Diverse methods were employed in the preparation of this RAP such as review of project documents; stakeholders' consultation meetings; and key informant interviews. 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 Ilemela Municipal Council 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

PAPs and other stakeholders' consultation 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. About 82 stakeholders were consulted and their views and suggestions have been summarized and accommodated by this RAP. 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 IMC 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 IMC The identified stakeholders include 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.

4.2 Key Issues Raised By PAPs and Other Stakeholders During Consultation Meetings

The following were the key issues raised by stakeholders during consultation meetings which are also detailed in Table 4.

1. ***Economic Benefits to be realized after Completion of Project:*** All consulted stakeholders including the PAPs were in the opinion that the proposed subprojects investments will reduce transport cost and open the project areas for other economic opportunities and foster economic growth for IMC.
2. ***Public Awareness:*** Public awareness should be a key of this project to avoid unnecessary grievances and conflicts.
3. ***Market Design:*** The design of the market should consider the types of business undertaken at the market i.e., space requirements for whole sellers and retailers as there are groups of vendors who need large open space e.g. the traders group registered as "Umoja wa Wauza Tikiti na Nanasi Kirumba (UWATINAKI).
4. ***Road Design: The designs of*** the proposed roads should consider provision of storm water drainage channels with proper end points to avoid flooding of people's residents in the lowland's areas during the rainy season. Also, along Buswelu-Nyamadoke road there are subsurface rocks which might need a special consideration on the road design.
5. ***Temporary Relocation Site:*** The MC should make all necessary preparation to the temporary relocation site including toilet facilities, water, electricity and sheds. Security of the areas should also be ensured, and the market vendors should be given enough time to prepare themselves before vacating the current market.
6. ***Compensations of assets that may be affected during construction phase:*** The PAPs were keen to know if the properties that will be affected during construction 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.
7. ***Allocation of Business Spaces:*** All traders currently doing business at the market should be given a priority in the allocation of business spaces at the temporary site and in the new market and there should be a special committee to supervise the process whereby the market committee is part of it.
8. ***Previous Land (Road) Survey by the IMC:*** *In* 2005 the IMC conducted road survey to establish the RoW. Under this survey some of the plots were valued and compensated e.g. from RC to Uhamiaji; and other plots were valued but were not compensated. For instance, at Nyamhongolo ward about 12 people whose lands were valued, and disclosure of compensation amounts was done but until now they are not paid their compensations. These people should be included in the current valuation and compensation of 20M.
9. ***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.
10. ***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.

11. ***GBV and sexual harassment:*** The experience shows that road projects are 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.

12. ***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 IMC, Ward and Street offices to ensure that hired staff are fairly paid according to provisions of existing legislations.

13. ***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?

14. ***Compensation procedure for Graves and 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 IMC 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, an asset in Buswelu – Busenga – Mnyamhongolo Road is labelled as VAL/COMP/IMC/BSL/008. 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:

a. Market value of unexhausted improvements
b. Disturbance Allowance
c. Transport Allowance
d. Loss of Profit
e. 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:

Accommodation Allowance = Rent/p.m. x 36 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.

Transport allowance = 12tons x Actual Cost/ton/km x 20km

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:

(i) Individual Land Owners which include individuals having crops, trees and structures within the project sites;
(ii) 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:

(i) Those who have formal rights to land (including customary/village land, traditional, and religious rights recognized under Tanzanian law);
(ii) 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
(iii) 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.

7. LIVELIHOOD AND INCOME RESTORATION PLAN

In IMC 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:

(i) Guidance and counseling on investment options.
(ii) Opening bank accounts for PAPs who don't have one;
(iii) Investing in time deposit scheme offered by formal financial institutions. These are reliable instruments for investment with guaranteed returns.
(iv) 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 PAPSs 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 1.

Table 1: Institutional Arrangements for RAP Implementation

Institutions	Description of responsibilities	Remarks
WBCU Safeguards Unit	• Oversee RAP implementation through quality control and ensuring that national laws and WB ESF standards are observed. • Ensure that the LGAs have done meaningful stakeholders Consultation • Identifying training needs of all parties involved in RAP implementation.	• To be supplied with RAP document. • To be supplied with stakeholders' consultation reports (evidence)

Institutions	Description of responsibilities	Remarks
Sub-ward/Streets Local Governments	• To participate in stakeholders' consultation meetings • To participate in asset inventory and census, • To sign compensation schedules • To participate in identification of missing PAPs • Identification of relocation sites • To participate in grievance management.	• To be integrated throughout the project cycle • To commence consultations prior to project start
Ministry of Finance	Approve and disburse to LGAs the requested compensation funds	The MoF is the highest government structure to approve for utilization of the public funds. Thus, it has a lead role in decision making.
Local Government Authorities	• Ensure compliance to the WB safeguard standards and Got rules and procedures • To work with consultant in preparation of sub project design and drawing • Undertaking stakeholders' consultation with relevant PAPs • Ensure PAPs needs and concerns are integrated • To identify corridor of impacts and owners of different assets along way leave • Prepare compensation schedules • Agreement with PAPs about expropriation. • Publication of the notice for the expropriation – declamation • Grievance management • Submit compensation schedules to relevant approval organs. • Identification of special groups and determine the required assistances • Make due compensation to PAPs before civil works begin in coordination PO-RALG and WBCU • Information sharing to all eligible PAP regarding compensation amount and size of land offered for compensation before	• Ensure fair evaluation of the properties • The procedure must be followed carefully and respecting the right of the third persons to prevent the complaint to the Court • The expropriation will be done for the persons who will accept to be compensated with the conditions published. • Ensure that compensation is done with respect (amount and time) of agreements signed by interested parties and before starting the project implementation

Institutions	Description of responsibilities	Remarks
	effecting of cash payment or land compensation • Sign the compensation agreements and issuance of PAP ID cards • Help in the identification of alternative land for those PAPs displaced from within the way leave • Monitoring and evaluation • Contribute to the GRM by designating members to the committees	
PAPs	• Participate in consultation meetings • To participate in asset inventory and valuation exercise • To participate in choosing restoration sites and livelihoods restoration programs • Opening a Bank Account • To vacate the site after compensation	The PIU to coordinate
PIU	• Spearhead RAP preparation and implementation process • Ensure that they work closely with PAPs • Formulate GRM and communicate it to the PAPs • Formulate Resettlement Committee • Participate on Monitoring and evaluation • Participate in Grievance management • To implement SEP • Arrange and coordinate PAPs financial literacy awareness	
Design consultants and LGA engineers	Providing designs to the RAP development team including explanations of the critical section that may require additional PAPs	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.
District Commissioner	• To oversee RAP implementation • To endorse compensation schedules • To participate in GRM	To be supplied with compensation schedules on time.
Regional Commissioner	• To oversee RAP implementation • To endorse compensation schedules • To participate in GRM	To be supplied with compensation schedules on time

Institutions	Description of responsibilities	Remarks
Chief Government Valuer	• To assess and endorse compensation schedules	To be supplied with compensation schedules on time
Land Resources and urban Planning Department	• Identifying and verifying property boundaries and ownership • Consistence of the proposed projects with urban planning	To be supplied with project designs To be involved in valuation exercise
The Bank (RAP Paying agent)	• Train PAPs on their financial services and management of compensation money • Ensuring PAPs are paid timely and in accordance to the payment schedule • Confirm eligibility of PAPs for compensation on the basis of his/her national identity card, driving license, or passport • Notify the PIU when payment has been done and proof of PAPs payments and their photographs	To be provided with payment schedule
Contractor	• Provide to PIU the final schedule of construction to be communicated to the communities in the wayleave and project areas • List and communicate all possible obstruction sections. • Prepare Site Specific Environmental and Social Management Plans • Provide labor requirements and consider employing local population and pay wages as per applicable norms • Compensate for any damages to assets outside of wayleave, in accordance with rates established in the and final RAP. • Traffic management during construction • Observe grievance redress procedures for construction-related impacts • Implement codes of ethical conduct to protect local population and contractor's workers against spread of HIV/AIDs, STDs, GBV and COVID-19.	To observe ESIA, RPF, and RAP

8.1 RAP Implementation Committee

To implement this RAP, Consultant propose three committees:

a) 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.

b) 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.
c) 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:

i) Disclosure of the RAP document with subsequent creation of RAP implementation committees, Grievance Management Committees.

ii) 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.

iii) 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.

iv) 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.

v) 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.

vi) Creation of Livelihoods Restoration Committee (LRC) and subsequent involving PAPs in selection of livelihood restoration options and trainings.

B. Activities to be completed before the beginning of construction works

i) Provision of livelihood restoration trainings to PAPs. This will involve procuring relevant professionals and conduction of trainings. The PIU will be responsible for this.

ii) 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.

iii) Payment of compensation, Provision of notices to PAPs on duration to vacate the project sites and subsequent vacation of land: The payment agent will effect 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 2.

Table 2: 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

iv) 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.

C: Activities for completion of RAP and Livelihoods Restoration Plans

i. *Conduction of HIV/AIDS sensitization awareness and campaigns*: This will be done to the local community and project workers. A combined report of these campaigns will be prepared by the RAP implementation agency as part of its monthly report and handed to the PIU.

ii. *Preparation of Periodic Internal Monitoring Reports***:** PIU will undertake internal monitoring to see whether all PAPs have vacated the site and there is no pending compensation and grievances. During this time an assessment on whether PAPs have judiciously spent compensation money will be done along with assessing condition of vulnerable people. Monitoring activities and generation of reports will commence soon after approval of the RAP.

iii. *Annual Project Review Workshop:* Review of RAP implementation at Annual Workshop will be carried after one year of RAP implementation.

iv. *RAP/LRP Implementation Completion Audit*: Implementation Completion Audit will be carried out at the end of all RAP related activities to ascertain whether the RAP objectives have been met. RAP/LRP Implementation Agency and Payment Agent (PA) shall separately produce Implementation Completion Report and submit to PIU. These reports together with the internal monitoring reports will be combined into a single Implementation Completion Report and submitted to the World Bank.

9.2 RAP Implementation Schedule

This RAP will be implemented in 14 months. Table 4 summarizes the month-wise activity schedule.

Table 3: RAP Implementation Schedule for TACTIC sub-projects in Ilemela Municipal 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															

S.NO.	ACTIVITY	MONTHS													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Disclosure of the RAP document														
	Creation of RAP implementation committees, Grievance Management Committees														
	Familiarization and 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														

S.NO.	ACTIVITY	MONTHS													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
	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 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 Ilemela Municipal 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 Ilemela Municipal 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; locations at the corridor of impacts of the proposed subprojects' sites; their associated allowances (accommodation, loss of profit, transport and disturbance allowances).

This RAP Budget is providing compensation costs and don't include programs for livelihood restorations, relocation of utilities, 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 nine hundred thirty-five million seven hundred thirty-seven thousand six hundred thirty-nine (2,935,737,639.88) as detailed in table 4.

Table 4: Itemized compensation budget

S/N	Item	Cost (Tzs)	Quantity (Affected Assets)	Source of Fund	Channel of Disbursement	Timing
1	Compensation of Land	250,835,990.00	m^2	Annual Council's budgets approved through parliament.	IMC	November 2022-January, 2023
2	Compensation of Buildings and fence /Structures	139,234,800.00	55	Annual Council's budgets approved through parliament.	IMC	November 2022-January, 2023
3	Compensation of Crops and tres	39,278,090.00		Annual Council's budgets approved through parliament.	IMC	November 2022-January, 2023

5	Compensation grave	2,400,000.00		Annual Council's budgets approved through parliament.	IMC	November 2022-January, 2023
6	Accomodation, transport, and disturbance allowances	65,160,000.00		Annual Council's budgets approved through parliament.	IMC	November 2022-January, 2023
7	Graves	**2,400,000.00**				
8	Transport Allowance	**750,000**				
9	Disturbance Allowance					
Sub-Total		2,519,946,472.00				
7	Management /administration monitoring & evaluation assistance (15% of total	377,991,970.8	NA	Annual Council's budgets approved through parliament.	IMC	November 2022-January, 2023

	compensation cost)					
8	Contingency (10% of Management /administration cost)	37,799,197.08	NA		IMC	November 2022-January, 2023
Sub-Total		415,791,167.88				
Total RAP Budget		**2,935,737,639.88**				

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 Ilemela Municipal 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:

a) If PAPs have been compensated in full before implementation of subproject activities; and
b) 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. Ilemela Municipal 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 Ilemela Municipal 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:

1. Affected individuals, households, and communities are able to maintain their subproject standard of living, and even improve on it;
2. Local communities remain supportive of the project; and
3. Absence or prevalence of conflicts.

The indicators in Table 5 below will be used to monitor and evaluate the implementation of resettlement and compensation plans.

Table 5: 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
	Number of emerging PAPs due to unforeseen construction impacts	Monthly
	Number of Encroachers existing within the compensated corridor	Monthly

Parameters	Indicators	Timeline
	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 VI: Health and Safety Management Plan

1.1 General

The project shall be implemented in compliance to labour laws in Tanzania, in particular, the Occupational Health and Safety Act (2003). Clauses to protect the health and safety of workers shall be included in the contract documents for implementation stage. All personnel are expected to comply fully with health and safety law and the associated approved codes of practice. Contractors are, in addition, to be aware of and pay due attention to guidance issued by the Health and Safety Executive as well as that issued by trade bodies and authorities, which constitute industry 'best practice'. Method and policy statements submitted for these works will be reviewed by the Site Project Manager and Safety Adviser to ensure that these standards are met. On such occasions that they fail to meet the standard they will be returned for amendment action.

1.2 Health and Safety Management System

1.2.1 Safety Training and Promotion

The aims of safety training programmers are:

- To update the safety awareness and technical skills of person in the field of application.
- To orient new employees to working environment.
- To identify and rectify hazards and convey the same to the workforce.
- To prepare the persons to select appropriate safety measure contain any unforeseen hazards/emergency situations.

To achieve the above aims, following types of training shall be conducted at the site level:

1.2.1.1 Health and Safety Induction Training

New or reassigned employees shall be given Health& Safety induction training pertaining to Health& Safety management and general safety rules and procedure, site specific Health& Safety rules and their responsibility and accountability in safety performance. Health& Safety induction shall be given to all categories of personnel at site by Health& Safety Manager. Health& Safety induction shall be recorded in the prescribed format. All employees shall acknowledge such training by signing relevant document.

1.2.1.2 On the Job Training

Based on the trade, individuals are given On the Job training. These trainings shall be focused on the safe ways of working in a particular trade including hazards involved. This shall be conducted by the foremen/supervisors in collaboration with Safety personnel and trainees' performance after the programme shall be assessed to evaluate the effectiveness of the training. All risk assessment and related knowledge shall be done by the Health & Safety Manager.

1.2.1.3 Refresher courses

Refresher courses shall be conducted to update the skill and safe methods of work for a particular job. This shall be conducted periodically for welding/cutting, plant and equipment operation, defensive driving and hazards in electrical installation.

1.2.1.4 Tool Box Talks

In addition to the formal training mentioned above, toolbox talks shall be conducted every day before the commencement of the job. TBT shall be designed to highlight relevant safety and individual health issue to the workforce to raise their level of awareness. Such meeting shall recall the risk assessment report and defects reported on previous performance. These shall be prepared and presented by the Supervisor/Foremen.

All trainings that are carried out shall be formally recorded on dated and signed by attendees and the copies shall be kept with the project safety focal point.

1.2.1.5 Safety Promotion

Safety Promotion schemes shall be developed and implemented at site to promote safety awareness amongst the workforce. Individuals with best safety performance shall be recognized and rewarded. A safety suggestion scheme shall be implemented at site to encourage the workforce to come up with good safety practices and suggestions for improving working condition. The best suggestion shall be selected and the person shall be rewarded.
Health& Safety posters and banners including HIV/AIDS shall be displayed around the worksite to raise the awareness among the workforce. The posters shall be prepared in English and Swahili languages.

1.2.2 Safety inspection and Follow up Actions

Contractor's Health& Safety Manager along with supervisory staff shall carry out frequent inspection with the focus on safety aspects at site and prepare reports of inspection. The frequency of inspection shall be determined by site activities and general conditions. However, the inspection shall be conducted at a minimum of once a week. Where high – risk activities are being carried out inspection shall be done at least once daily.
The inspection reports shall be discussed with the site managers and various sub – contractors (if any). In addition to these, the site staff will accompany the Engineer and other staff of Consultant for their site safety inspection.
Remedial action to rectify any deficiency identified or unsafe practices discovered during the safety inspection by developer shall be implemented immediately.

1.2.3 Reporting of Accidents, incidents & Investigation and Accident Statistics

Tanzania laws on incident reporting and investigation procedures shall be adhered. Such law requires reporting to the Chief inspector of Occupational Safety and Health Authority (OSHA) all lost time injuries (LTI) within twenty-four hours from the time of incident. Contractor will play this role to ensure that local requirements are followed. As per Contract Agreement the Contractor shall notify the Consultant and developer within 48 hours or as soon as reasonable possible after the occurrence of any accident which has resulted in damage or loss of property, disability or loss of human life, or which has or which could reasonably be foreseen to have a material impact on the environment and shall submit to the Consultant and developer no later than 28 days after the occurrence of such an event in the agreed format, a summary report thereof. All incidents including near misses shall be reported to the Consultant, regardless the potential of the incident.
All the incidents shall be investigated to find out the root causes and to prevent the recurrences of the same kind of incidents. If the consultant asks for the detailed investigation and the findings shall be submitting to the consultant. The methodology for the incident investigation shall be "Find out the facts, not the faults".

Incident data, if properly collected and analysed, indicates the trend and can show where and how problems arise. A monthly safety performance report of the project shall be included in the Monthly Progress Report after the end of each month.

1.2.4 Hazard Identification and Risk Assessment

The purpose of the hazard identification and risk assessment is to identify all potential hazards and associated risks during construction. The contractor will take relevant measures to control all critical, high and moderate hazards. Low potential hazards will be totally eliminated. General risk assessment of this project has already been done and submitted to the relevant parts per Tanzania's Occupational Safety and Health Laws.

Depend on the severity of hazards we will be able to take necessary preventive and control measure to mitigate the hazards. Prior to the commencement of any activity, detailed hazard identification shall be done by the site supervisory staff with the assistance of Health& Safety Manager and the hazards shall be communicated to the whole team deemed to execute the task. The hazards analysis done shall be produced to Consultant for approval and mitigating measures shall be taken up to their satisfaction. Risk assessment shall be done per Occupational Safety and Health Act, number five of 2003.

1.2.5 Industrial Health and Hygiene

Hazards to health on a construction industry can arise from the use of a number of materials, substances and process if they are not properly controlled. Some of the more serious risks are caused by the inhalation of dust, toxic fumes, exposure to high temperature, noise, vibration, radioactive substances, ergonomic hazards etc.

IMC and Contractor shall be responsible for maintaining health working conditions for all employees and sub – contractors. If it is not possible to remove the cause of harm, then suitable and sufficient Personal Protective Equipment (PPE) shall be provide to those who could be affected.

1.2.1.1 Hazardous substances

Material Safety Data Sheet (MSDS) of all hazardous materials that are used on site (if any) shall be obtained. An inventory shall be kept of all such materials with the relevant MSDS and shall be available for the inspection of consultant. 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 enforcer. 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.

1.2.1.2 Heat

Illness due to heat comprises a wide range of problems from minor inconvenience to critical medical emergency and death. The functioning of the thermoregulatory system of the body gets upset, (balance between heart gain and heat loss), which results in the subsequent loss of salt and water. This takes the following forms like heat rashes; heat cramps; heat exhaustion and hear stroke. Following precautions shall be taken against heat stress.

- Wear light, airy clothes.
- Drink plenty of water even if you do not feel thirsty.

- Wear sunglass/balaclava while working outside.
- New employees shall give adequate time to acclimatize with the hot environment before deploying to the work site.

1.2.1.3 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, introduction of PPEs will be adopted. 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 system shall be adopted to control the dust on all identification areas of the Project.

1.2.1.4 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 defends with proper training to use them.
- 85 dB (A) – Signposts shall be erected to inform all employees and public that usage of car defenders 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.

1.2.1.5 Vibration

Vibration causes health hazards in two ways;

- Vibration of body parts due to hand held tools like concrete vibrator, plate compactor, jackhammer, hand drill, hand grinder etc.
- Vibration of the whole body experienced while traveling in vehicle and operating equipment like dozer, grader, roller etc.

Excess vibration will result in discomfort to the worker, which leads to a decrease in efficiency and finally causes damage to health. Vibrating equipment shall be equipped with proper handles to prevent causing any impact on the operator. Personnel shall be given intermittent rest or shall be changed and replaced frequently.

1.2.1.6 Sanitary Facilities

Adequate sanitary conveniences will be provided in strategic point of the workplace. Such conveniences are lavatories, showers, and washbasins. Such facilities shall be kept clean and in good working condition at all times. Domestic wastes shall be collected per environmental management plan and Environmental Guidelines.

1.2.6 Personal Protective Equipment (PPE)

PPE protects the employee from identified non-eliminated hazards at the site. Personal protective equipment safeguards the employee from the identified hazards so which he is exposed. PPE is the

last line of defence for employee protection. PPE does not and cannot eliminate hazard, it can only prevent or reduce exposure to hazards and reduce the severity of the consequent injury.

All employees of the contractor shall be provided with necessary PPEs and ensure that the contractor and sub – contractor personnel are also properly protected by appropriate PPE. Such provision will be free of charge. Employees shall be trained by line supervisors for the correct utilization of the PPE. Individuals shall not be allowed to work if they are not equipped with the appropriate PPE. Suitable signboards shall be kept in work area indicating the potential hazards (e.g. noise, radiation etc) and PPE that is required to be worn in that area/for that activity, in applicable languages and visual signs. The signage will be in Kiswahili and English languages and posted in visible areas.

1.2.7 First Aid Facilities

All accidents, which involve personal injury, whether it is minor or major, shall be given medical treatment and report to concerned Supervisor. A first aid station shall be set up at the site office and a trained first aider will be in charge of the station. All injury cases, except minor injuries shall sent to medical centre present within the Ilemela Municipal Council (IMC) for treatment. In case of an accident with personal injury doctors will attend such person in a prescribed hospital. Only ambulance will be allowed to transfer the casualties. Adequate number of first Aid boxes will be fixed in strategic points where employees will be notified the nearest location of the same, telephone number of Emergency control room will be also displayed. Adequate number of first Aid boxes shall be available site. There shall be one trained first aider in a group of 20 persons. First aid boxes shall be frequently inspected by the trained first aider and updated.
The Contractor shall comply with the Government medical or labour requirements at all times and provide, equipment and maintain base dressing stations where and at all times have trained first aider for attending minor injuries.

1.2.8 Fire Prevention and Fighting Facilities

Construction sites premises are very prone to fire hazards because of different kind of combustible material used in all the above places. The components of a fire are fuel (combustible substance), heat and oxygen. Unless all three are present fire will not occur. A fire hazard evaluation shall be conducted all the project sites and camp to identify the fire risk at each location. Depend upon the risk factors fire prevention and fighting system shall be provided and maintained.
Following steps shall be taken to implement fire prevention system at our project premises.

- All the employees shall be education about the fire hazards, firefighting methods and precautionary measures specific to this project.
- Adequate number of portable fire extinguishers shall be placed at strategic locations.
- All employees shall be demonstrated the operation of portable fire extinguishers.
- Good housekeeping shall be maintained at all sites to reduce the fire risk.

1.2.9 Road safety management

This project as relies heavily on road transport. Analysis shows that road accidents contribute a major portion of total accidents in such construction projects. To avoid road accidents, the following measures shall be adopted during the execution of project;

- 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.

- All vehicles shall be kept in a plot with good conditions and preventive maintenance system shall be followed.
- An in-house training on defensive driving techniques and safe tipping operation shall be imparted to all drivers before allotting vehicles to them.
- The drivers shall follow all traffic rules and regulation of Tanzania.
- Over speeding shall not be allowed at any case and if observed do so disciplinary actions shall be taken against the defaulter.
- Drivers shall not allow working more than 8 hours shift period. The shift period includes loading, unloading, waiting and driving time.
- No vehicle shall be allowed to drive after consuming alcohol/drugs, some medicines, under fatigue or when sick or ill.
- Nobody is allowed to drive if under the influence of alcohol or drugs.
- Drivers shall wear necessary PPEs while driving.
- A driver forum shall be constituted and shall meet once in a month or immediately after an incident to discuss the general safety issues as well as specific leaning points from incidents.
- Only one person shall direct the driver/operator
- Beware signage shall be established on public institutions' entrances

1.2.10 Traffic management plan

This project involves movement of heavy traffic both at the site and outside the Site. All drivers are instructed to strictly follow the minimum speed of 20 KPH at the site. Adequate sign boards will be placed at the relevant location and flag man will be assigned whenever necessary. Anybody found violating the traffic rules will be punished.

1.2.11 Sub-Contractors

Subcontractors are treated as integral part of the contact and subject to the same standard of treatment as that of main contractor's employees in all matters pertaining to Health& Safety. List of subcontractors shall get approved by developer prior to their deployment in the project.

On arrival of Subcontractor's employees, Health& Safety Manager shall conduct induction program. Sub-contractor employees shall participate in all Health& Safety activities along with Contractor's personnel working under the Contract.

1.2.12 General Safely Rules

All personnel working at site always shall strictly follow following Health& Safety rules:

- Never take their eyes off the job, pay attention to what you are doing.
- Shall be on the lookout for hazardous conditions that could lead to an accident.
- Shall pay attention to what you are doing.
- Shall be in a continuous observation of hazardous conditions that could lead to an accident.
- Shall report all first aid injuries, lost time accidents and near misses immediately to their supervisors.
- Shall wear proper uniforms and other personal protective equipment necessary for the job that they have to do.
- Shall ensure that they have the right tools and equipment for the job.
- Check the tools condition before using it.
- Shall always use provided personal protective equipment like overall, helmet, goggles, shoes and balaclavas etc.
- Shall know the location of the nearest fire extinguisher first aid box.
- Shall always keep work place clean and tidy.

- Shall not play with fire. Smoking in 'No Smoking' area only.
- Shall not interfere with overhead electrical supplies and appliances.
- Shall observe all warning signs, labels and hazard notices.
- Shall not overtake and over speed vehicles in high traffic areas. Shall observe all speed limits and traffic controls.
- Shall not use unstable material/platform for working, climbing and standing purpose.
- Shall not abuse toilets and welfare facilities provided for their use.
- Shall always take care when lifting load. Keep straight back and bent knees
- Shall not keep any material or obstacle in access ways or exit path.
- Shall not operate cranes over or in the close proximity of power lines.
- Shall take sufficient water and fluid regularly during hot and humid weather conditions.
- Safety is everybody's responsibility.

1.3 Safety in Various Construction Activities

1.3.1 Excavation

Excavation is one of the important phases of the construction activity. Any insufficient attention to the safety aspects may cause of accident, therefore we shall take utmost care in planning and executing all excavations. The following precautionary measures shall be followed:

- The area to be excavated shall be inspected thoroughly by a competent person for any underground services or structures.
- It shall be ensured that a person having good knowledge and experience supervises all excavations.
- All mechanical excavations shall be carried out only in the presence of an authorized banks man.
- The integrity of excavation and supports shall be inspected prior to the commencement of work on daily basis.
- No soil or other materials shall be stored close to the sides of the excavation and at least 1m clearance shall be provide for storage and dumping of excavated materials.
- Edges of excavations shall be barricaded to prevent falling of persons and materials.
- If vehicular traffic is allowed near to the excavation, contractor shall provide adequate lighting, warning signs and concrete blocks painted with reflective paints.
- Excavations exceeding 1m shall be demarcated with solid barricades plus warning tapes. The rest shall be barricaded with warning tapes.
- Where there is a possibility of ingress of water then pumping sumps shall be established with pumps being readily available for use and additional ladders placed for use in the event of emergency evacuation.
- Adequate means for entry and exit shall be provided for excavations over 1.5m and it shall be either ramp or ladder.
- All the personnel engaged shall be made aware about safe digging practices, hazards in the operation and emergency procedures.
- Adequate number of strong and stable temporary crossing with handrails shall be provided for personnel.

1.3.2 Reinforcement Steel Work

Reinforcement steel work is an essential part of any construction phase. The activity involves unloading, bar bending, cutting and fixing of bars in position and people's unsafe acts. The main hazards are handing hazards, working with machinery, using of electricity, falling of material on body and taken.

- Loading and unloading of steel shall be done by proper lifting equipment lifting tackles and under proper supervision.
- All persons handling steel bars shall be provided with necessary PPE required for the job.
- The lengthy steel bars shall be stored in safe manner to avoid in tripping hazards and protruding hazards. Proper signage shall also be provided.
- Bar cutting machines and bending machines shall be in good working condition and provided with emergency stop switches and necessary guards. Both the machine shall be placed in such a way that the operation on it shall not create any danger to nearby workers.
- The electrical connections to the machine shall be done by electrician by providing appropriate circuit breakers and proper earthling after conducting risk assessment.
- Persons deployed for cutting and bending shall be trained and instructed about the job and its inherent hazards.
- The work area shall be kept clean and steel cut pieces will be kept separate.
- Adequate number of works shall be deployed to handle and fix the steel.
- The tools used for fixing the steel in place shall be inspected regularly and maintained properly.
- If the steel fixing work is at height or in an excavated pit/trench, safety measures shall be taken in accordance with the accordance with the particular procedure.

1.3.3 Concreting

This includes shuttering, formwork, de-shuttering and concreting. The main hazards are falling of objects; struck by object, falling of persons from height, crush injuries and impact injuries, ergonomic related, tripping and slipping. The following practices shall be adhered to ensure the safe operation in these activities.

- The persons deployed on work shall be given a safety induction related to the job. They shall participate in the risk assessment.
- The persons deployed on work shall have well experience and provided with all tools in good working condition.
- Handling, erection and dismantling of heavy shuttering shall be done with proper lifting equipment under close supervision.
- Required PPE shall be provided to all persons engaged in the job.
- The workers shall be informed about the hazards of the activity.
- The area shall be barricaded to prevent the entry of unauthorized persons and visitors.
- Hand tools shall be inspected on daily basis.
- There shall be effective communication between the crew members while erecting and dismantling the shuttering.
- Good housekeeping shall be maintained all over the area.
- Formwork for the concreting shall be inspected by a competent person, prior to the pouring.
- The concrete pump shall jack-up properly and park at firm and level ground.
- Two persons wearing reflective jackets shall be deployed to hold the concrete pouring pipe.
- Always look for overhead electrical cables while parking the concrete pump.
- Temporary platforms shall be provided on steel work for people to stand while working at the area.
- Tipping shall be away from overhead power lines

1.3.4 Material Handling

1.3.4.1 Mechanical Handling

Lifting equipment and lifting gears shall be inspected per Occupational Safety and Health Laws of this Country and should be used for handling of construction materials. All lifting equipment shall be

checked and ensured that they are in good operating condition and free form defects. All lifting equipment and tackles shall have valid third-party certificate. Inspection intervals shall be as per Tanzania laws and safety regulations. Inspection and certification shall be done from Tanzania's approved competent authority which is Occupational Safety and Health Authority (OSHA). Color coding system for lifting equipment shall be followed. All lifting operations shall be done by experienced persons and supervised by competent persons. In case of tandem lifting only the Project Manager shall authorize such lifting. The following safe practices shall be adhered in all mechanical lifting operation. The following safe practices shall be adhered in all mechanical lifting operation.

- All lifting equipment and tackles shall be maintained in good operative condition.
- Every dangerous and rotating parts of lifting equipment shall be guarded.
- Care shall be taken to avoid the overloading lifting equipment and tackles.
- All lifting operation shall be performed under the supervision of an experienced and trained supervisor.
- Signalman with reflective jacket shall be deployed with the lifting equipment.
- Only one signalman shall direct the operator
- Proper communication shall be maintained between the operator and signalman during the operation.
- Wind speed shall be taken into consideration before lifting and if it exceeds the safe limit all lifting operation shall be ceased.
- Extreme care shall be taken while working near overhead power lines and safe distance shall be maintained.
- Toolbox talks shall be conducted before lifting operation for prevention of incidents.
- Only the project Manager shall authorize tandem lifting.

1.3.4.2 Manual Handling

Correct manual lifting and handling procedures can prevent back injuries and strains that account for a major portion of all industrial injuries. Before handling any material, its weight, size, shape and physical characteristics are to be seen and further action shall be taken accordingly. Following are the measures to prevent the incidents during manual handling.

- Load to be lifted shall be assessed for its weight, shape and size.
- Load shall be sized up ad assistance sought if necessary.
- Proper method and posture of lifting shall be adopted.
- Load being carried shall not obstruct the view in front.
- Do not change position of load while moving.
- Slipping and tripping hazards shall be taken care of.

1.3.5 Working at Height

1.3.1.1 Scaffolding

Proper scaffolding and working platform shall be provided to work at height. All scaffolds shall be designed by a competent person and shall be made of good and standard materials. Prior to use, all scaffolds shall be subjected to the inspection of the consultant and shall get approval. All persons involved in the erection and dismantling of scaffold shall be trained and experienced for the same. No persons other than the supervisor involved shall be permitted to be upon any part of an incomplete scaffold.

- All personnel shall be provided with necessary PPE.
- Persons with vertigo shall not be allowed to work at any height.

- All poles, planks and general materials used for scaffolding shall be kept in good condition and be inspected by a competent person on each occasion before being issued from stores.
- As long as the scaffold is in use, supervisor concerned shall inspect it daily before allowing persons to work on it and satisfy himself that the scaffold is complete and is fit for use.
- Subsequent to rain or heavy wind, the scaffolding supervisor shall inspect all scaffolds prior to restart the work.
- All working platforms shall be close boarded and all boards shall be lashed and secured.
- Handrail and toe board shall be provided for all scaffolds and the planks shall be tied to the ledgers properly.
- Scaffolds shall be supported adequately wherever possible
- Always ensure that no loose items and materials are left at height that may fall on person working or passing beneath.
- In case of mobile towers, the height shall never exceed three times the length of the shortest side and there shall be only one working platform on a mobile scaffold.
- The mobile tower shall only be moved by pulling or pushing the base and the working platform shall be clear of men and materials when the tower is being moved.
- The wheels of mobile tower shall be turned outwards and brakes shall be on and locked before use.
- Diagonal bracing shall be fitted on all lifts on all sides and cross bracing shall be fitted at the base and every alternative lift of an independent tower scaffold.
- Adequate ladders shall be provided for the access to and egress form the scaffold.

1.3.1.2 Ladders

- All ladders shall be factory made and of sound construction.
- Wooden ladders shall not be used with the scaffold.
- If the work is being done in and around electrical equipment and/or cables only wooden (non-conductive) ladders shall be used.
- Ladders shall not be painted.
- Ladders shall be secured properly at top and base.
- Ladder shall be extended for at least on meter above the landing.
- Ladders shall not be used as working platform or part of load bearing component of a scaffold.
- The base to height ratio of ladder shall be maintained as 1:4 such that the angle is 750 from the horizontal can be maintained.

1.3.6 Heavy equipment and workshop

Construction project mostly depends on heavy equipment like Dozer, Excavator, Grader, Wheel Loader, Backhoe and Crane. So, the safe operation and maintenance of heavy equipment play a major role in accident prevention. A workshop facility shall be set up in the lay down area to perform routine maintenance and repairs of equipment deployed for the project. Following measures shall be taken to ensure safe operation and maintenance of equipment and plant:

- Equipment shall be put into service after obtaining approval by a competent technical authority.
- All the operators shall have valid Tanzania license and thoroughly educated about the safe operation and maintenance of equipment.
- It shall be ensured that operators are performing daily checks before commencing the activity and report abnormalities, if any.
- All operators shall undergo frequent refresher training on safe operation and basic firefighting.
- No one shall be allowed to travel in the cabin along with the operator.

- Equipment shall be transported from one place to another only by low bed trailers and proper lashing shall be ensured while transporting through road.
- Adequate space shall be available in the workshop for free movement of vehicle / equipment and each activity shall be performed in a clearly defined area.
- Hazardous activities like painting, welding, cutting, grinding etc. shall segregate from other activities normally will do in dedicated booths.
- Storage of hazardous materials shall be in a secured and dedicated area as per Tanzania Policy standards.
- Emergency exit, fire alarm and firefighting equipment, first aid box, requirement to wear PPE and other necessary safety information shall be displayed at prominent locations with visible signs.
- Adequate lighting and ventilations shall be provided in all work places.
- Adequate provision shall be made for the collection, temporary storage and disposal of solid and liquid waste material from all workplace.
- Good housekeeping standards shall be maintained.
- Smoking and consumption of food shall be restricted to designate area.
- No horseplay or practical work jokes shall be allowed in work place.

1.3.7 Cable Laying, Termination and Jointing& Electrical Works:

Laying of high voltage and low voltage cable and other Electrical works are one of the activities in this project. The main hazards involved in these are struck by, falling of materials, fall of persons, and failure of lifting equipment and tackles, fire and burn injuries. Following precautionary measures shall be taken to avoid any incidents during this stage.

- Risk assessment shall be conducted prior to execution of such job.
- All electrical works shall be performed by qualified persons who shall be provided with adequate and necessary personal protective equipment.
- Prior to maintenance operations on any electrical equipment or appliances, the electrical current shall be disconnected, (lockout and tag out) with a lock or any other adequate means and tagged out to ensure the prevention of reenergizing of the equipment by any person during work.
- Employees working in electricity shall be instructed in using the proper fire extinguishers in electrical fires such as Dry Chemical and CO2 extinguishers.
- Water or extinguishers containing water shall not be used in extinguishing electrical fires which occur in electrical equipment or conductors as water is a good conductor which causes electrical shocks for the person using the extinguisher.
- Metal ladders or non-insulated hand tools shall not be used while working in electrical installations. (Handles of all hand tools used shall be insulated and wooden ladders shall be used)
- When the fuse or circuit breaker disconnect the electrical circuit, electrical current shall not be re-connected before inspecting the cause of the fault and repair it and thus replace the fuse with other fuse of the same rating or the circuit breaker shall be returned to its first position by a qualified employee.
- Electrical circuit shall not be overloaded to prevent occurrence of fires.
- Electrical wires shall not be passed through doors or windows and shall be kept away from heating sources such as heaters and shall not be hung from nails to prevent the damage or wearing of the insulating material.
- Defective or corroded electrical wires shall not be used and shall immediately replace.
- Cable drums shall be placed on level and firm ground and properly wedged to prevent rolling off.

- Jacks and other accessories for cable laying shall be inspected by a competent person to make sure that if is free from defects.
- Rollers shall be placed properly to avoid the over exertion of force on cables while laying.
- The winch shall be fixed firmly on ground to prevent any unintended movement while pulling the cable.
- Experienced and trained persons shall be deployed for cable laying and winch operation.
- All cable jointing and terminations shall be done by certified and approved cable jointers.
- Adequate fire safety measures shall be taken care while termination and jointing the cable.
- The area shall be barricaded to prevent the entry of unauthorized persons during the operation.
- In case a person receives an electrical shock, this person shall not be touched, first, disconnect the power and remove the injured person away using a piece of wood or any other insulated material, and then, first aid shall be provided to the injured person such as Cardiac Pulmonary Resuscitation (CPR). The doctor shall be informed immediately or the injured person shall be taken to the nearest hospital.
- When recharging batteries, employees shall be instructed not touch the battery liquids, and shall be provided with adequate and suitable personal protective equipment when doing that (Face shield, rubber gloves, aprons) and when refilling batteries by acid, acid shall be added to water (and not water to acid), in case any burns by the effects of acids occurred, immediately flush the burn with big amount of water.

1.3.8 Portable Power and Hand Tools

The main causes of most injuries involving hand tools are the use of unsuitable tools, their incorrect use or their incorrect storage. Inspect the tool and ensure that it is in good condition. Unsafe tools include wrenches with cracked or worn jaws, screwdrivers with broken tips etc.

- Select the right tools for the job.
- Use all tools correctly.
- Keep tools in a safe place.
- We shall train the workers to select the right tools for each job, and ensure that the tools are available.
- Protect the edges of the sharp tools while carrying.
- Tools shall not be kept lying on floor, walkways or scaffolds,
- Tools shall not throw from one level to another. It shall be lifted and lowered by hand lines.
- All guards and covers shall be securely fitted and correctly adjusted.

1.3.9 Transportation

This section outlines the procedure and guideline for avoidance for motor vehicle accidents.

- Every person driving a motor vehicle or operating a machine must possess valid driving licenses appropriate to the class of vehicle being driven.
- All drivers should observe posted speed limits. Adverse weather conditions, traffic and light (visibility) require lower speeds than posted speed limit. Maximum speed limit must be limited 40 KPH in camps and 60 KPH on haul roads.
- All vehicles shall be parked uniformly and where provided, in designated parking areas. Parked vehicle shall not be obstructing other vehicle, roads, and access ways for fire hydrants.
- Vehicle shall be maintained in good condition and regular inspection carried out to check steering system, foot and parking brakes, tyres, seat belts, horn, Head lights, tail lights, stop light and indicators, rear view mirrors, wind shield wipers and washer, crank case and radiator level.
- Drivers and passengers in all vehicles including buses should wear seat belts.
- Driver shall slowdown in inter section, blind corners and stop completely at all stop.

2.0 Emergency Preparedness and Response

2.1 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

2.1.1 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.

2.2 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

2.3 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.

2.4 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.

Appendix VII: Hydrology Study Report

1.0 Road Drainage Systems and Flood Protection

This section presents the suggested system to protect Buswelu – Busenga – Coca Cola and Buswelu – Nyamadoke - Nyamhongolo Roads 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 0-3.**

Table 0:3:Performance of statistical distributions1, Mwanza Airport station.

Distribution	Np	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

[1] $Np =$ 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.

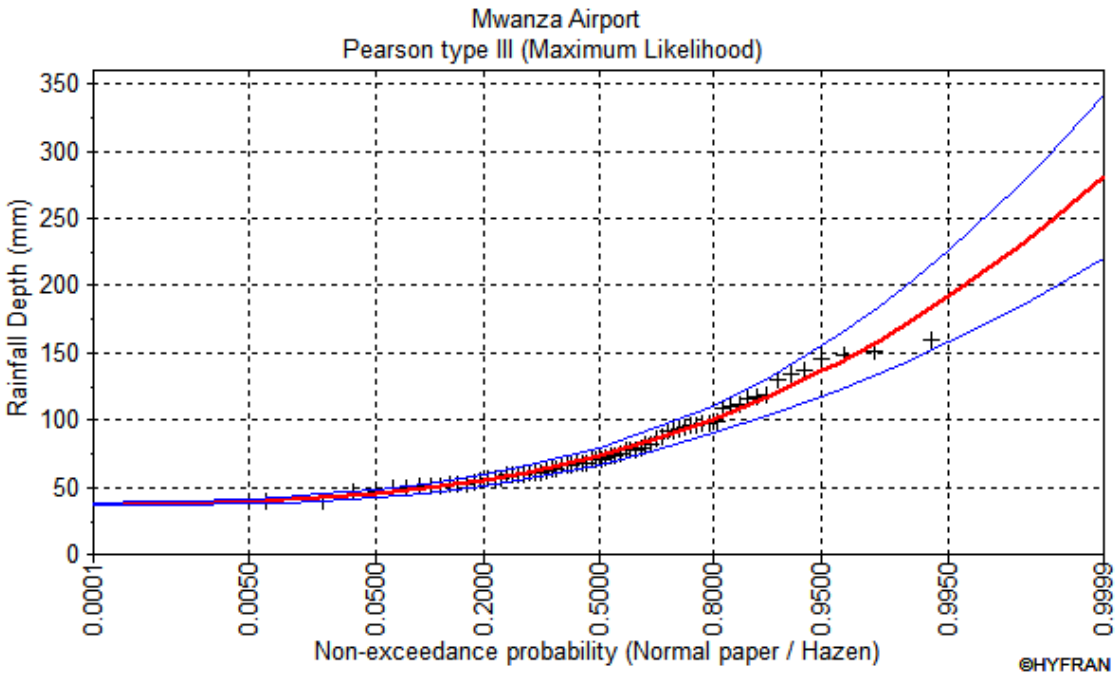


Figure 0-3: The Pearson type III distribution fit to Mwanza Airport AM daily rainfall data.

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 Ilemela

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 0-4**.

Table 0:6: Depth-Duration-Frequency (DDF) values for Ilemela

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 Ilemela

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

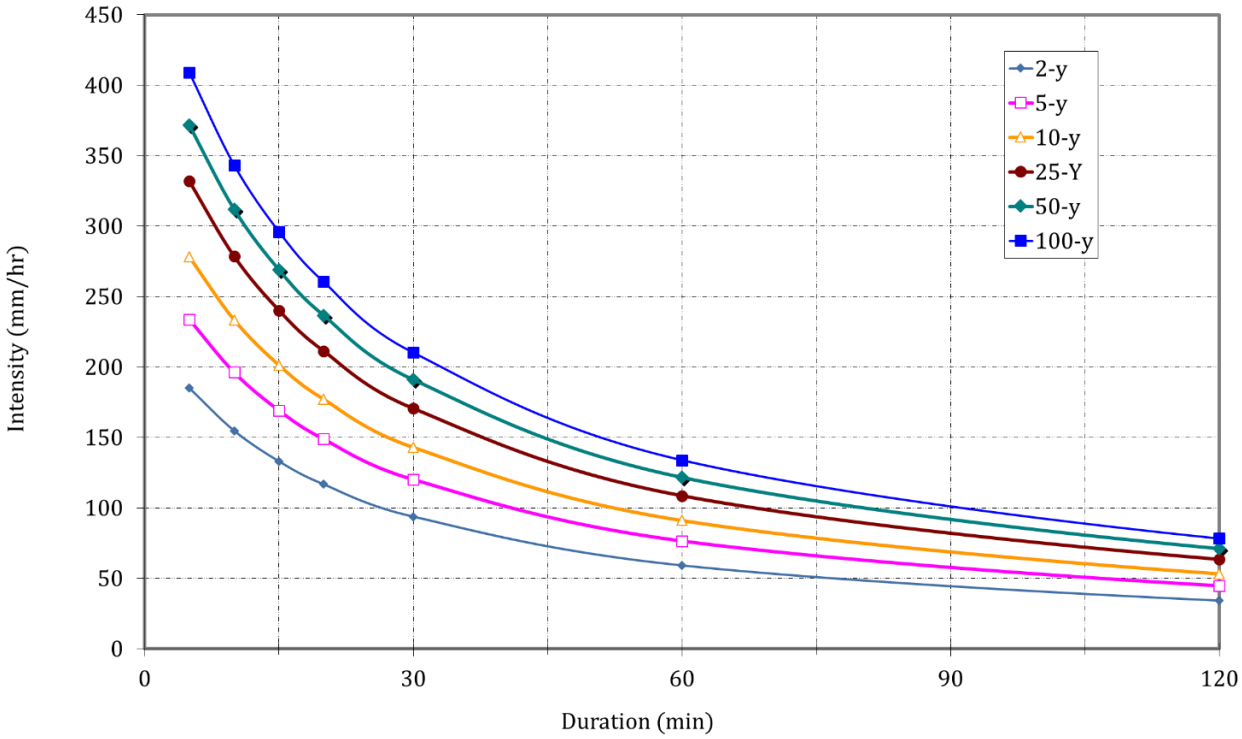


Figure 0-4: Intensity-Duration-Frequency (IDF) curves for Ilemela

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^2

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^3/s).

C: Runoff coefficient.

A: Catchment area (km^2).

I: Rainfall intensity corresponding to the catchment time of concentration (Tc)(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***
Business	
Downtown areas	0.70 - 0.95
Neighbourhood areas	0.50 - 0.70
Residential	
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
Industrial	
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
Lawns	
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
Streets	
Asphaltic	0.70 - 0.95
Concrete	0.80 - 0.95
Brick	0.70 - 0.85
Drives and walks	0.75 - 0.85
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 1km2 and 200Km2. 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^2
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_S	Unit less
10	Rainfall Zone (dry/wet)	None	Unit less
11	Catchment wetness factor	C_W	Unit less
12	Land use factor	C_L	Unit less
13	Rainfall time	T_P	Hr
14	Rainfall time index	N	Unit less
15	2-year daily point rainfall	$R^2/24$	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/dsviewer.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/m2 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):

$$X_T = \overline{X} + K_T S$$

Where X_T is the design value at return period T, $\overline{X}$ 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 0-5 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.

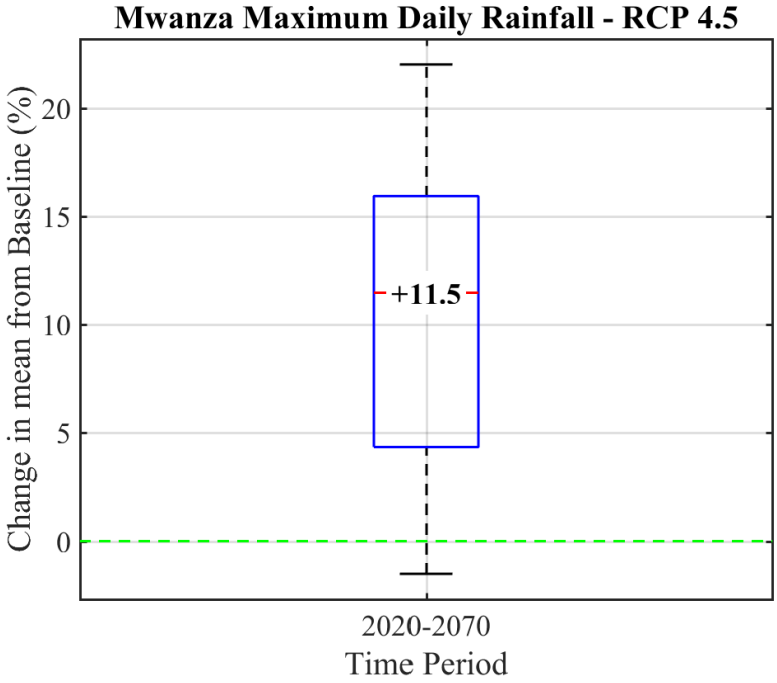


Figure 0-5: Projected percentage change in the mean of annual maximum daily rainfall.

On the other hand, **Figure 0-6** 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.

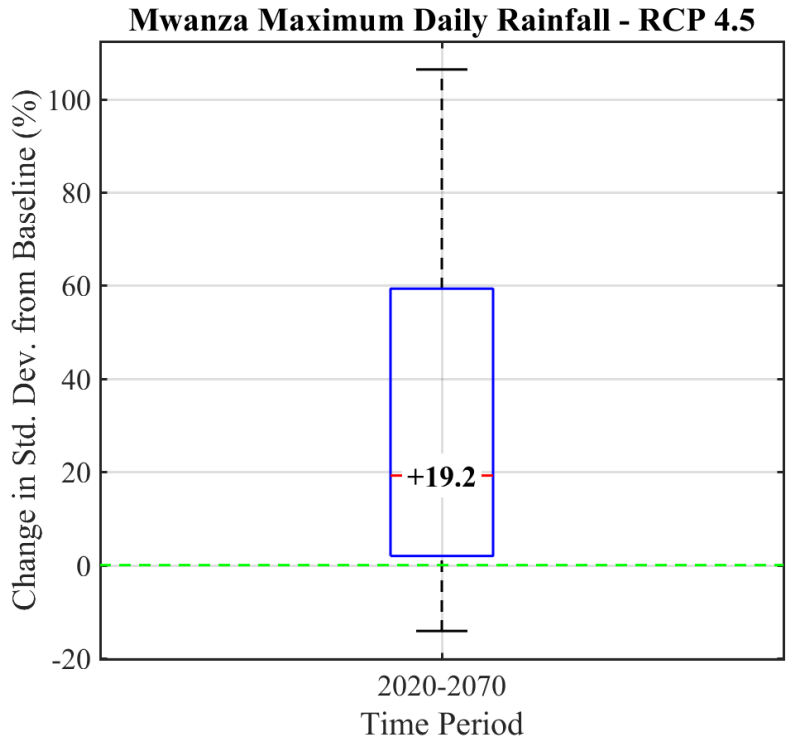


Figure 0-6: Projected percentage change in the standard deviation of annual maximum daily rainfall

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 (km2)

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 Land-use 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 0-7**.

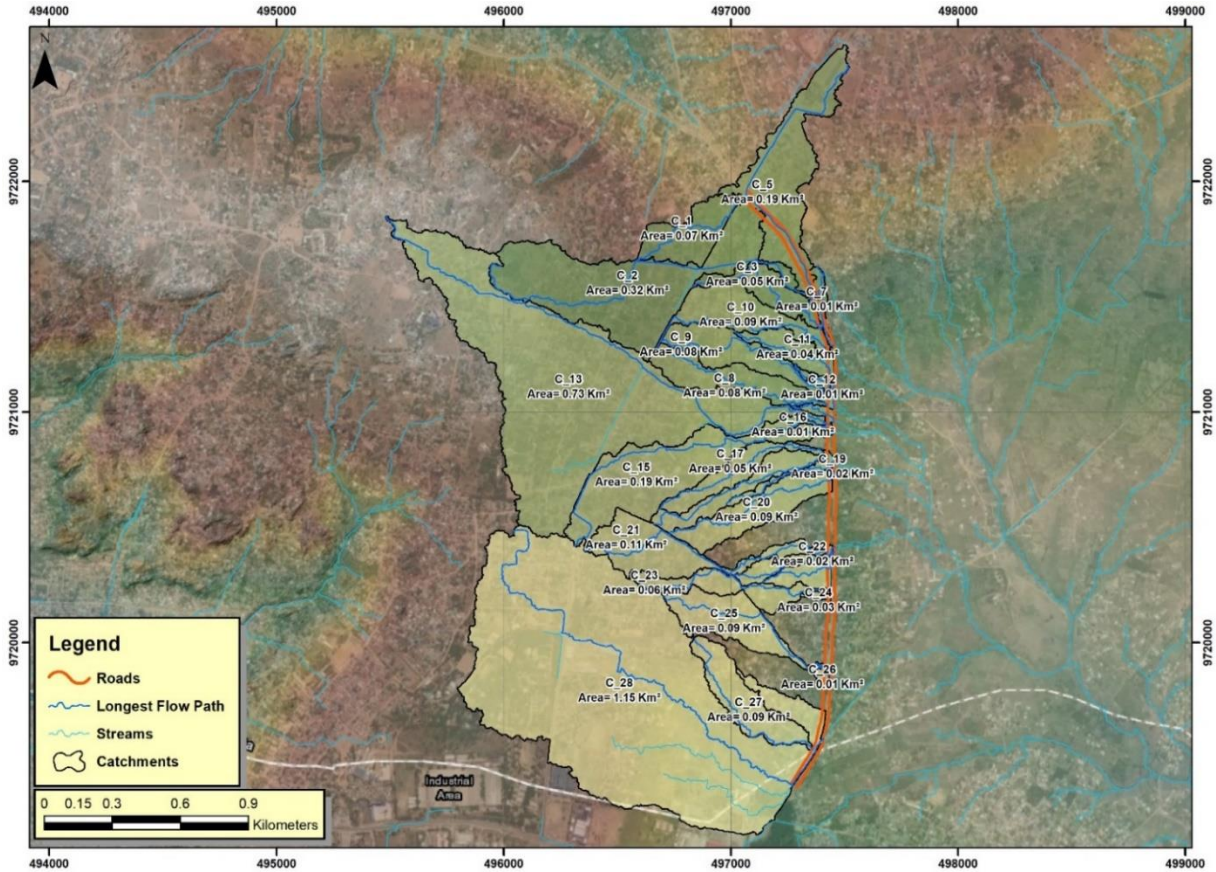


Figure 0-7: Catchment Delineation for Buswelu-Busenga-Coca cola Road and Catchment Areas

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 depends 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:

$$V = \frac{1}{n} R^{2/3} S^{1/2}$$

$$\text{And} \quad Q = A * V$$

Where:

A = Area of wetted cross section of the channel, m^2

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^2, 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^2, 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 conducted 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

Buswelu-Busenga-Coca Cola Road is connecting Buswelu and Igoma districts south of Ilemela city, it's subjected to several streams from the west 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.

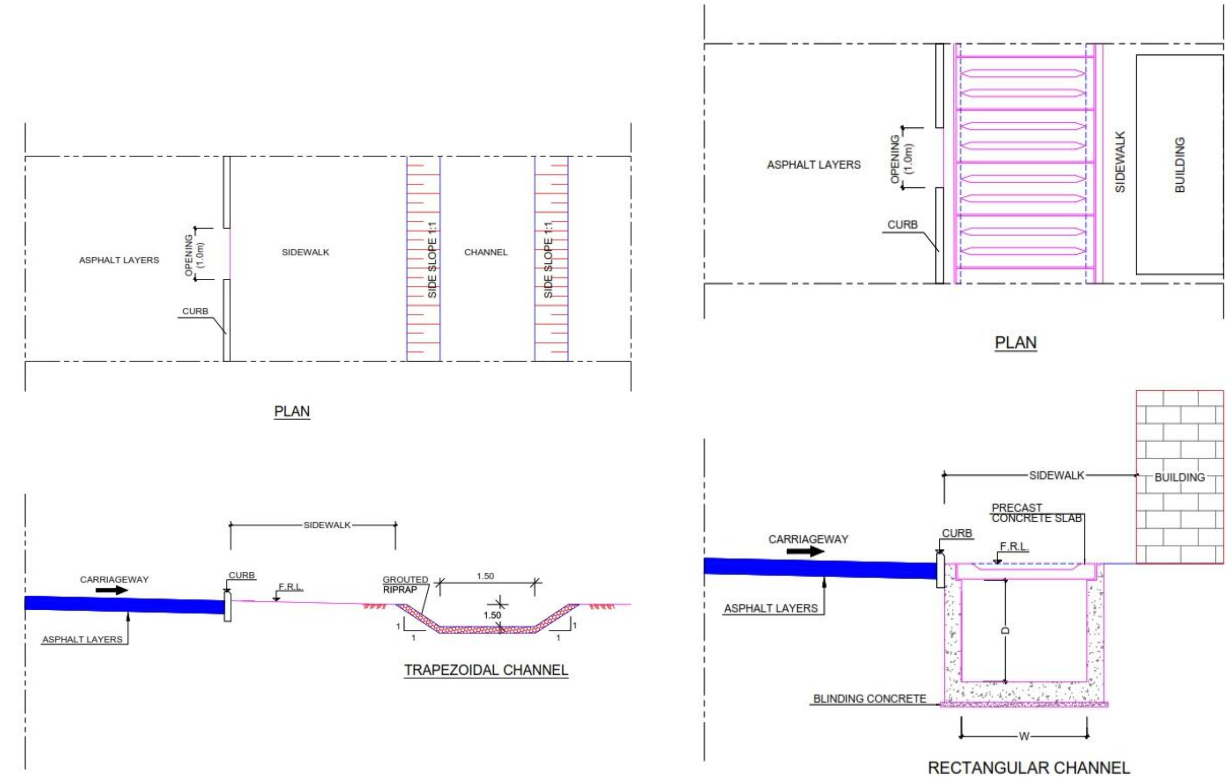


Figure 0-8: Cross-section for the used channels

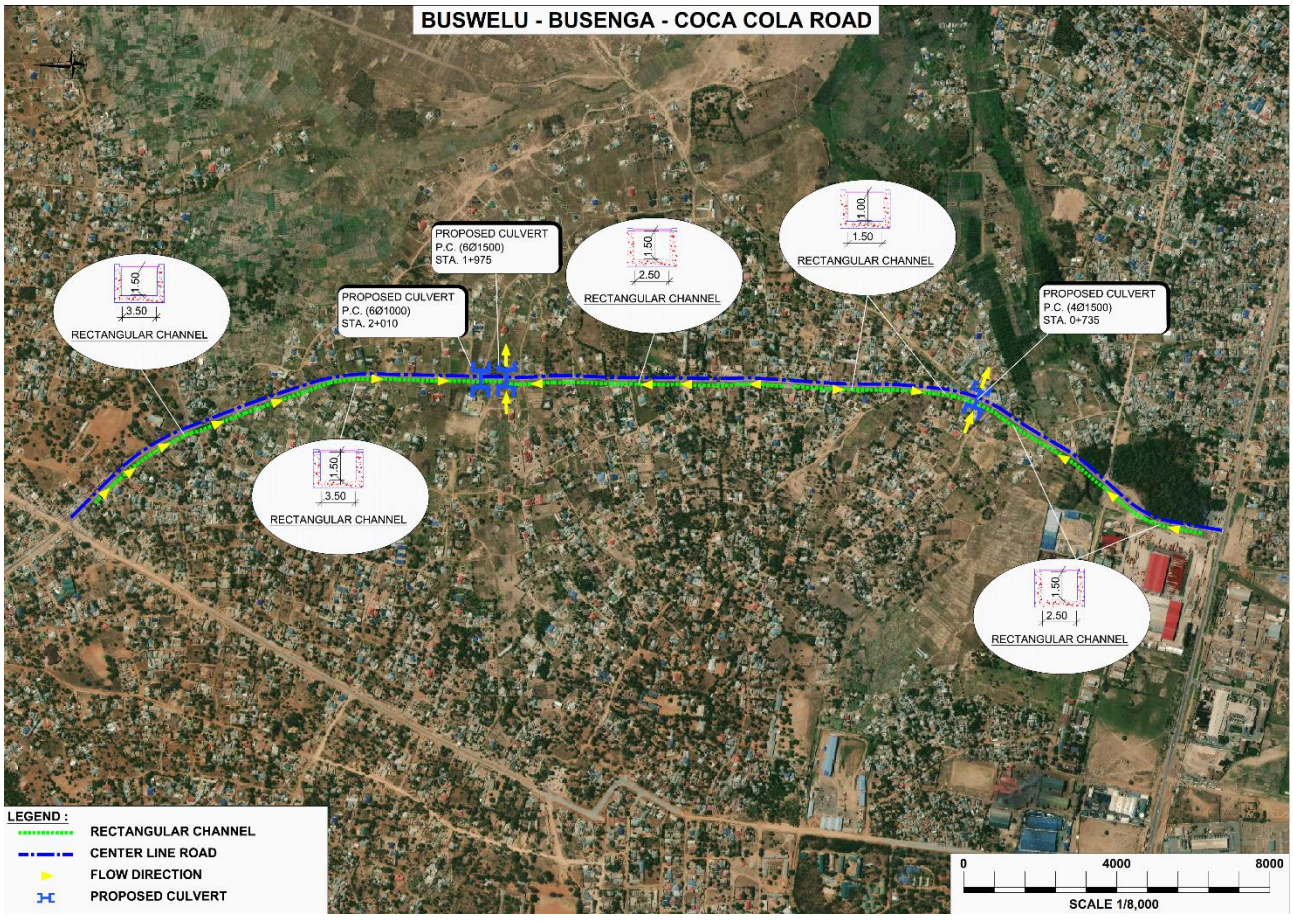


Figure 0-9: Proposed drainage system for Buswelu – Busenga – Coca cola Road

Table 0:12: Catchments Areas and flows

CAT_ID	A (km2)	C	Tc(min)	Q Rat. 25yrs	Q Rat. 50yrs	Ditch No.	Culvert No.
C_1	0.074	0.400	30.801	1.37	1.53	0	0
C_2	0.316	0.400	66.582	3.55	3.97	1	1
C_3	0.053	0.400	43.630	0.78	0.88	1	1
C_4	0.000	0.400	3.329	0.01	0.01	1	1
C_5	0.190	0.400	61.861	2.24	2.51	0	0
C_6	0.007	0.400	11.152	0.21	0.23	0	0
C_7	0.006	0.400	16.798	0.15	0.16	0	0
C_8	0.082	0.400	43.176	1.23	1.37	1	1
C_9	0.079	0.400	44.407	1.16	1.30	1	1
C_10	0.087	0.400	46.776	1.24	1.38	1	1
C_11	0.043	0.400	33.707	0.76	0.85	1	1
C_12	0.008	0.400	20.502	0.19	0.22	1	1
C_13	0.734	0.400	86.666	6.79	7.60	1	1
C_14	0.007	0.400	15.629	0.19	0.21	1	1
C_15	0.194	0.400	66.282	2.19	2.45	1	1
C_16	0.014	0.400	24.390	0.29	0.33	1	1
C_17	0.054	0.400	41.841	0.83	0.93	2	1
C_18	0.058	0.400	43.580	0.86	0.96	2	1
C_19	0.015	0.400	30.479	0.28	0.31	2	1
C_20	0.090	0.400	39.208	1.44	1.61	2	1
C_21	0.113	0.400	56.920	1.40	1.56	2	1
C_22	0.024	0.400	24.975	0.50	0.56	2	1
C_23	0.061	0.400	49.087	0.84	0.94	2	1
C_24	0.029	0.400	20.393	0.68	0.76	2	1
C_25	0.091	0.400	38.369	1.48	1.65	3	2
C_26	0.006	0.400	8.428	0.17	0.19	3	2
C_27	0.085	0.400	40.057	1.34	1.50	4	2
C_28	1.151	0.400	99.396	9.42	10.55	4	2
C_ADD1	0.077	0.400	22.785	1.69	1.89	2	1
C_ADD2	0.008	0.400	6.355	0.24	0.27	1	1
C_ADD3	0.063	0.400	25.181	1.30	1.46	3	2
C_RD1	0.019	0.400	10.000	1.33	1.49	1	1
C_RD2	0.011	0.400	10.000	0.77	0.86	2	1
C_RD3	0.007	0.400	10.000	0.46	0.52	3	2
C_RD4	0.007	0.400	10.000	0.47	0.52	4	2

Table 0:13: Sizes for proposed culverts

No.	ID	Area (km2)	Q50/25 (m3/s)	Slope (%)	Station	SIZE
1	CU01	2.18	29.23	1.00	1+975	6X1500mm
2	CU02	1.41	14.64	1.00	0+735	4X1500mm

Table 0-0:14: Sizes for proposed channels

				Rectangular closed channel			
ID	**Area (km2)**	**Q50/25 (m3/s)**	**Slope (%)**	**SIZE (HxD)**	**Top Width (m)**	**Start Station (DS)**	**End Station (US)**
DT01	1.65	19.95	0.50	1x3.50x1.50	3.50	1+975	3+200
DT02	0.53	9.27	0.30	1x2.50x1.50	2.50	1+975	1+250
DT03	0.17	3.41	0.50	1x1.50x1.00	1.50	0+735	1+200
DT04	1.24	11.23	0.35	1x2.50x1.50	2.50	0+735	0+050

Appendix VIII: 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 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 **Ilemela Municipality**; 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.

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).

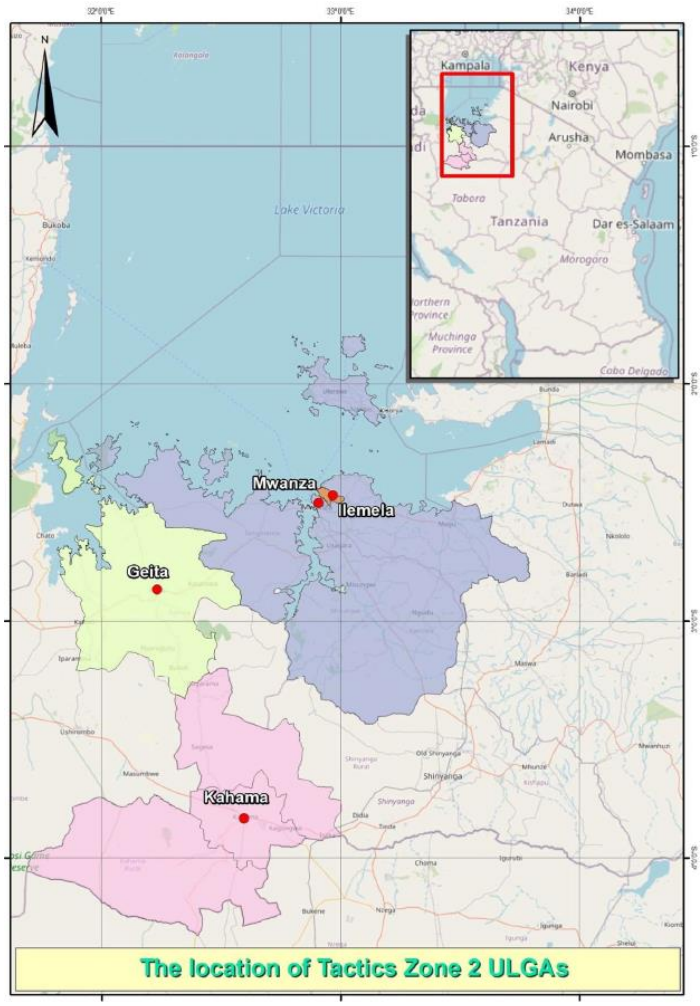


Figure 1: Location of tactic zone 2

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).

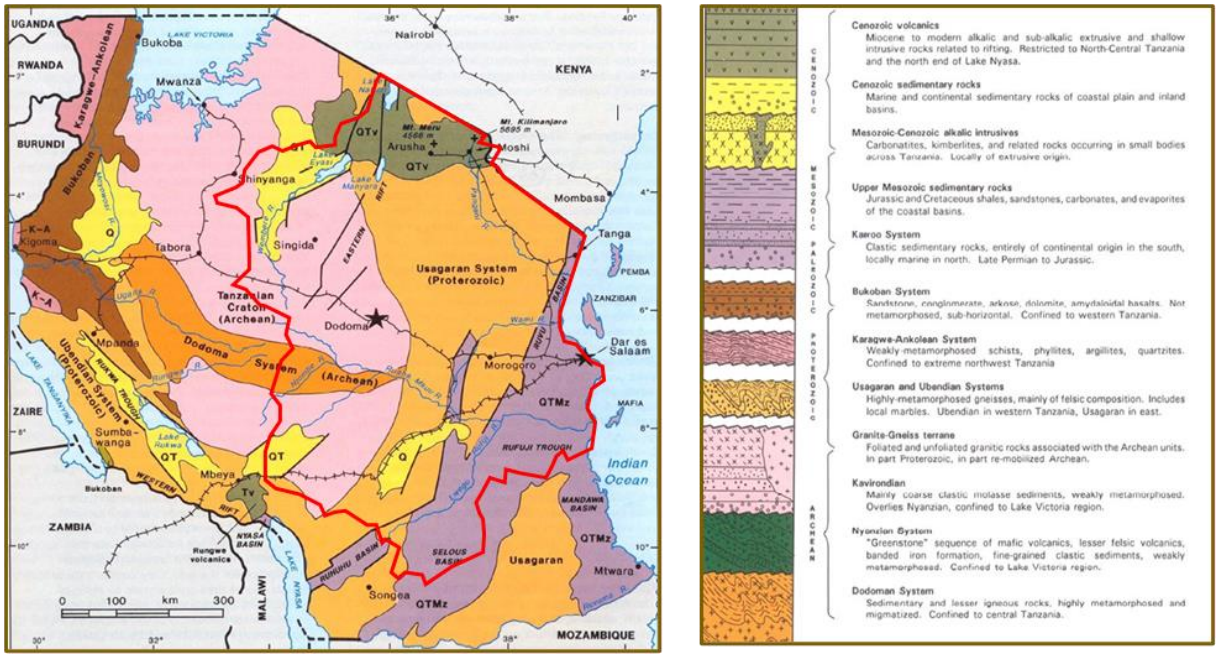


Figure 2: Google Earth satellite Images showing the site history of the project area.

1.3.1 General Geological Setting of Mwanza

Ilemela Municipality is located in the north western part of Tanzania to the south of Lake Victoria. The City of Ilemela is located in the north-western part of Tanzania to the south of Lake Victoria. Ilemela 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 Ilemela. Area forms 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.

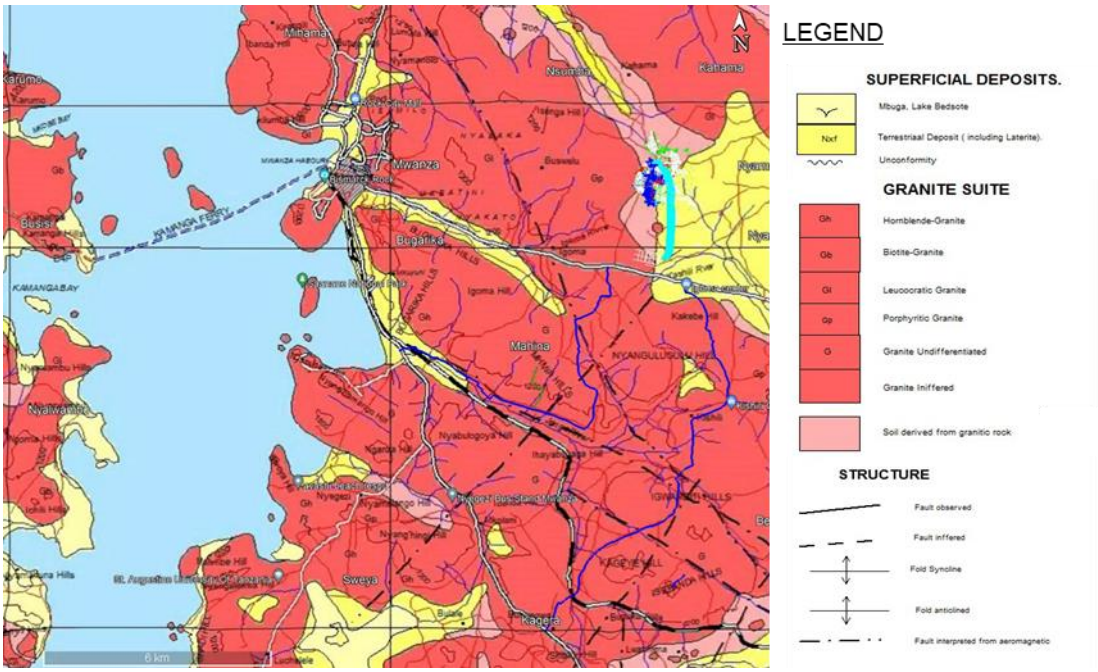


Figure 3: Geologic map of Mwanza and Ilemela, Geological Survey of Tanzania, 2002. (Scale 1:100,000)

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, collapsible and contains dissolution cavities, in places.
- The black clayey soil may have swelling/shrinking properties.
- The soil contains rock blocks in some locations.

ii. Soil aggressiveness
- Ilemela 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

To the date of this geotechnical report, the provided investigations cover the logs in-situ and laboratory test results of samples taken in 4 borehole and 40 trial pits in the study area.

- Boreholes were drilled to 10m 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 Ilemela

Performed Site investigation

Eight (8) test pits of depth 1.1m to 3.0m in were excavated along Buswelu - Busenga-Cocacola (Area E), and Twenty-one (21) test pits of 0.0m to 3.0m depth in Buswelu – Nyamadoke – Nyamhongolo (Area F). The below table and figure show the coordinates and location of the site investigation for Ilemela area.

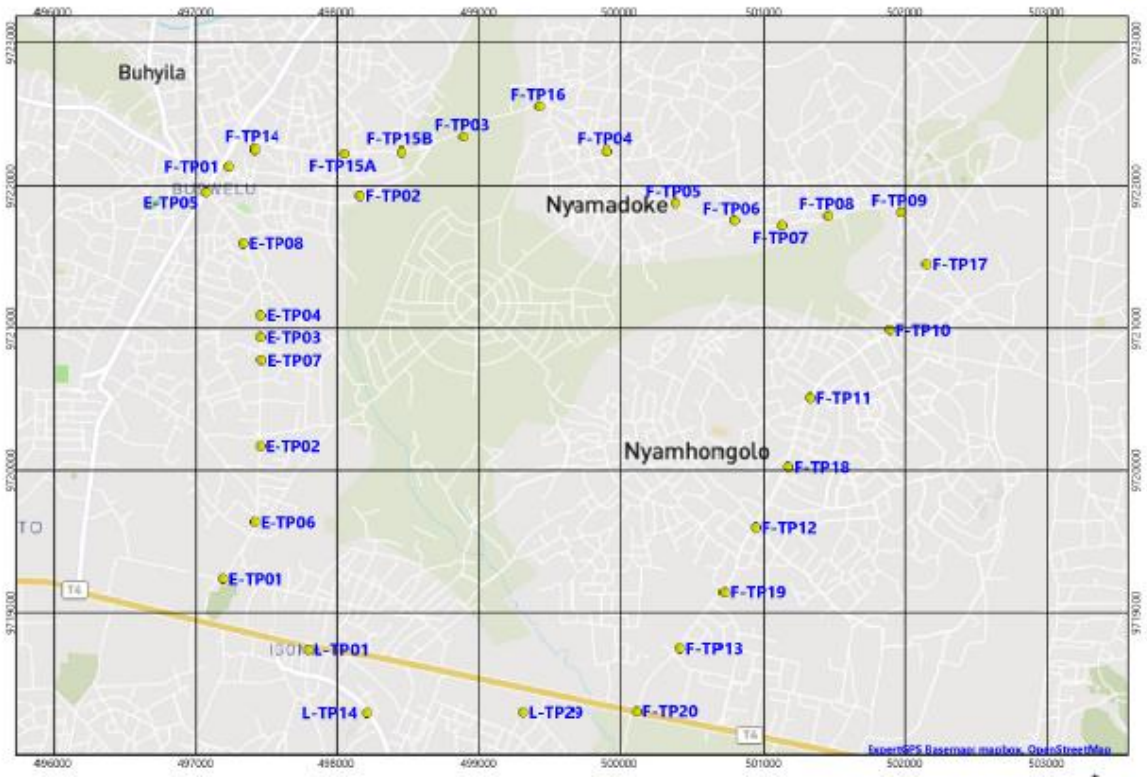


Figure 4: Layout and coordinates of the Site investigation program in Mwanza area

ID	Easting	Northing	Depth	Area	
E-TP01	497,185.74	9,719,237.83	2.3	Ilemela	Buswelu - Busenga - CocaCola Rd
E-TP02	497,448.52	9,720,172.16	1.1	Ilemela	Buswelu - Busenga - CocaCola Rd
E-TP03	497,452.80	9,720,938.47	2.8	Ilemela	Buswelu - Busenga - CocaCola Rd
E-TP04	497,452.91	9,721,093.94	1.4	Ilemela	Buswelu - Busenga - CocaCola Rd
E-TP05	497,066.47	9,721,959.51	3	Ilemela	Buswelu - Busenga - CocaCola Rd
E-TP06	497,411.04	9,719,637.57	1.5	Ilemela	Buswelu - Busenga - CocaCola Rd
E-TP07	497,456.49	9,720,777.05	2.7	Ilemela	Buswelu - Busenga - CocaCola Rd
E-TP08	497,328.52	9,721,602.17	1.5	Ilemela	Buswelu - Busenga - CocaCola Rd
F-TP01	497,225.70	9,722,138.86	2.7	Ilemela	Buswelu - Nyamhongolo Rd
F-TP02	498,157.17	9,721,936.00	1.6	Ilemela	Buswelu - Nyamhongolo Rd
F-TP03	498,889.66	9,722,336.58	1.6	Ilemela	Buswelu - Nyamhongolo Rd
F-TP04	499,901.95	9,722,242.96	0.95	Ilemela	Buswelu - Nyamhongolo Rd
F-TP05	500,384.61	9,721,882.48	0.5	Ilemela	Buswelu - Nyamhongolo Rd
F-TP06	500,786.37	9,721,763.01	2.8	Ilemela	Buswelu - Nyamhongolo Rd
F-TP07	501,122.91	9,721,725.81	1.5	Ilemela	Buswelu - Nyamhongolo Rd
F-TP08	501,448.26	9,721,794.41	2	Ilemela	Buswelu - Nyamhongolo Rd
F-TP09	501,968.32	9,721,817.42	2.7	Ilemela	Buswelu - Nyamhongolo Rd
F-TP10	501,886.75	9,720,990.62	2.7	Ilemela	Buswelu - Nyamhongolo Rd
F-TP11	501,320.86	9,720,512.41	1.1	Ilemela	Buswelu - Nyamhongolo Rd
F-TP12	500,938.00	9,719,597.60	0.6	Ilemela	Buswelu - Nyamhongolo Rd
F-TP13	500,418.82	9,718,751.42	2.3	Ilemela	Buswelu - Nyamhongolo Rd
F-TP14	497,408.44	9,722,255.08	2.9	Ilemela	Buswelu - Nyamhongolo Rd
F-TP15A	498,049.10	9,722,232.10	1.4	Ilemela	Buswelu - Nyamhongolo Rd
F-TP15B	498,449.53	9,722,241.39	0.75	Ilemela	Buswelu - Nyamhongolo Rd

F-TP16	499,422.92	9,722,548.57	1.25	Ilemela	Buswelu - Nyamhongolo Rd
F-TP17	502,148.66	9,721,455.33	0	Ilemela	Buswelu - Nyamhongolo Rd
F-TP18	501,167.25	9,720,026.33	1.9	Ilemela	Buswelu - Nyamhongolo Rd
F-TP19	500,719.36	9,719,144.40	2.9	Ilemela	Buswelu - Nyamhongolo Rd
F-TP20	500,114.72	9,718,306.12	3	Ilemela	Buswelu - Nyamhongolo Rd

Trial pits less than 2.7m had restrictions such as groundwater, hard rock or concretes detailedon the logs

Soil Stratigraphy

The soil in the provided boreholes in ILEMELA consists mainly of:

BUSWELU - BUSENGA- COCACOLA Road

- Test pits were excavated along the road alignment from E-TP-01 to E-TP-08.
- Test pits TP-01 and TP-03 shows that the upper layer consists of sandy CLAY or clayey Sand (CBR 95% 4 & 8) followed by clayey SAND with fines of 15% to 30% then followed by Rock layer in TP-01 at 2.3m depth. Tesrt pit TP-02 shows the upper 0.4m is sandy Clay with roots followed by silty Sand with CBR 95% = 6 and the groundwater appears at 1.0m depth. The weak layer is to be replaced to a depth 1.0m (with rock fill in the groundwater depth).
- Test pit TP-04 (St 2+150 to 2+450) shows that the soil layer is CLAY (high plasticity, PI=35) with roots then followed by weak layer followed by Sandy CLAY layer. CBR 95% is in the range 2 to 6. The groundwater appears at 1.0m depth. The weak layer is to be replaced to a depth 1.5m (with rock fill in the groundwater depth).
- Test pit TP-04 shows that the layers are weak CLAY with sand percentage of 31% to 55%.
- Test pit TP-05 to TP-08 shows upper silty gravelly Sand to depth 0.9-1.20m with CBR 95% from 7 to 9. In TP-05 & TP-08 followed by Gravel (CBR 95% =8, 11). In TP-06 & TP-07 followed by sandy Clay of intermediate plasticity (PI =23). TP-07 (St. 1+600 to 2+000) shows clayey Sand in the upper 1.2m with CBR95% = 9 followed by stiff sandy Clay of intermediate plasticity (PI =29). The CBR at 95% is shown below with depth, all values are below 15. The soil classification on the trial pit samples as per PMDM 1999 classification is shown below. It can be seen that 65% of the soil is classified G3 (which contains mainly Clayey soils with high fines content and may not be suitable for improved subgrade fill), and 36% as G7.

In addition, **Appendix A** shows the full lab test results for the soil for each test pit.

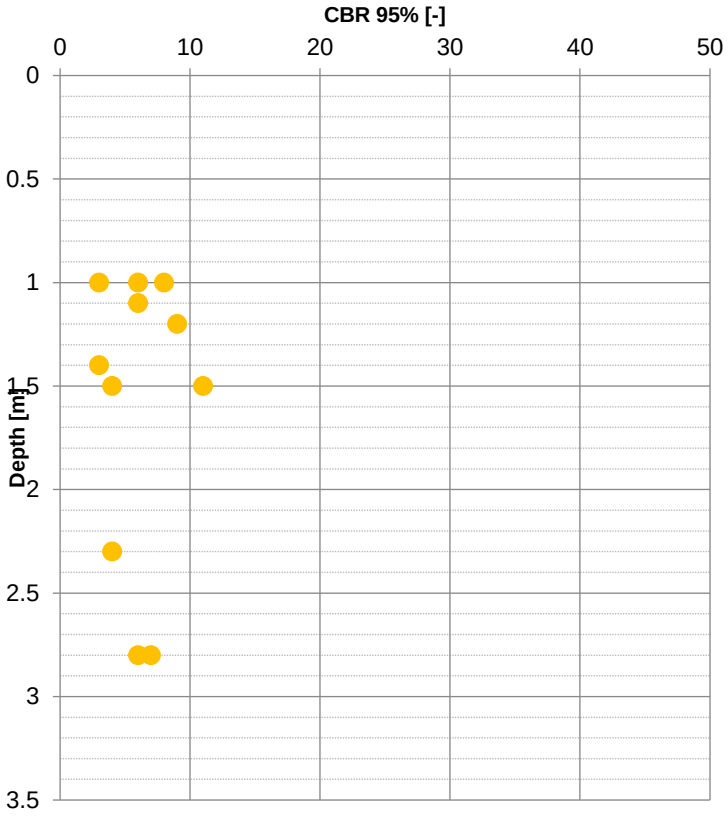
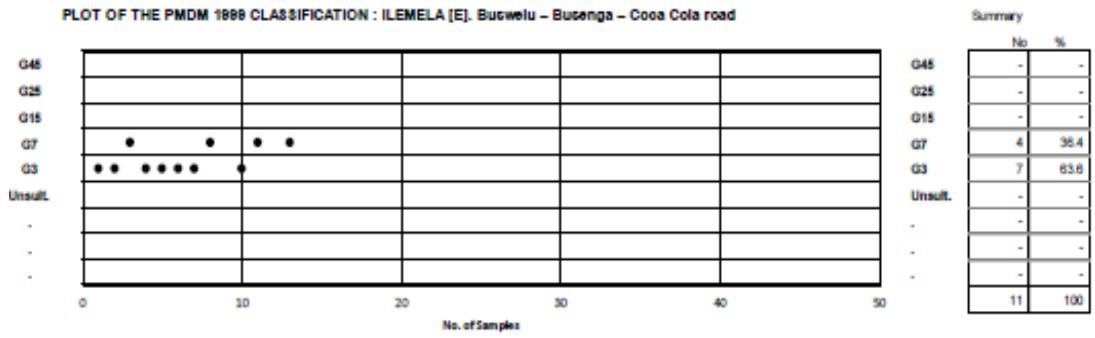
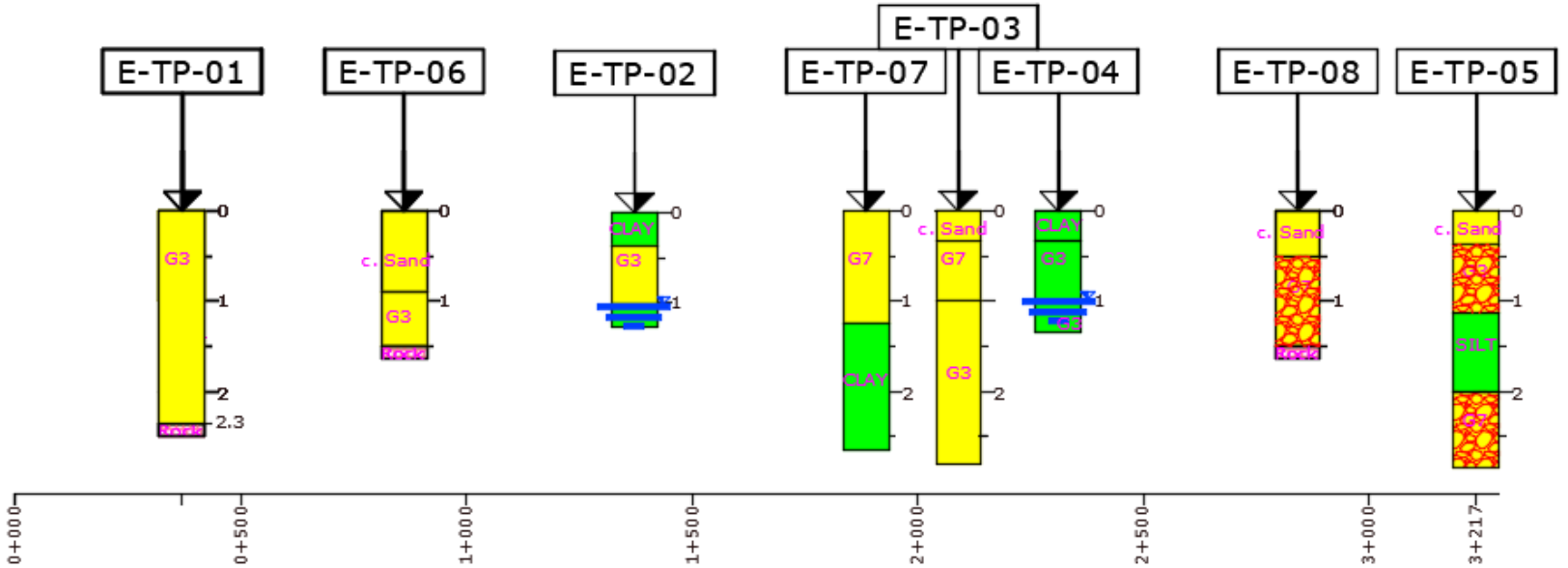


Figure 5: CBR distribution along the depth for Buswelu – Busenga – Cocacola Road

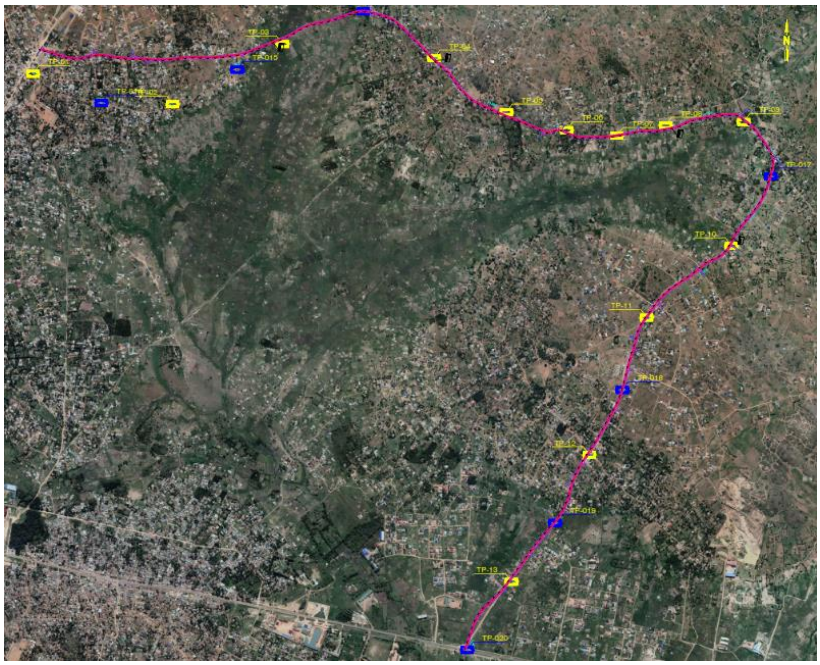




BUSWELU - BUSENGA- COCACOLA Road Test pits

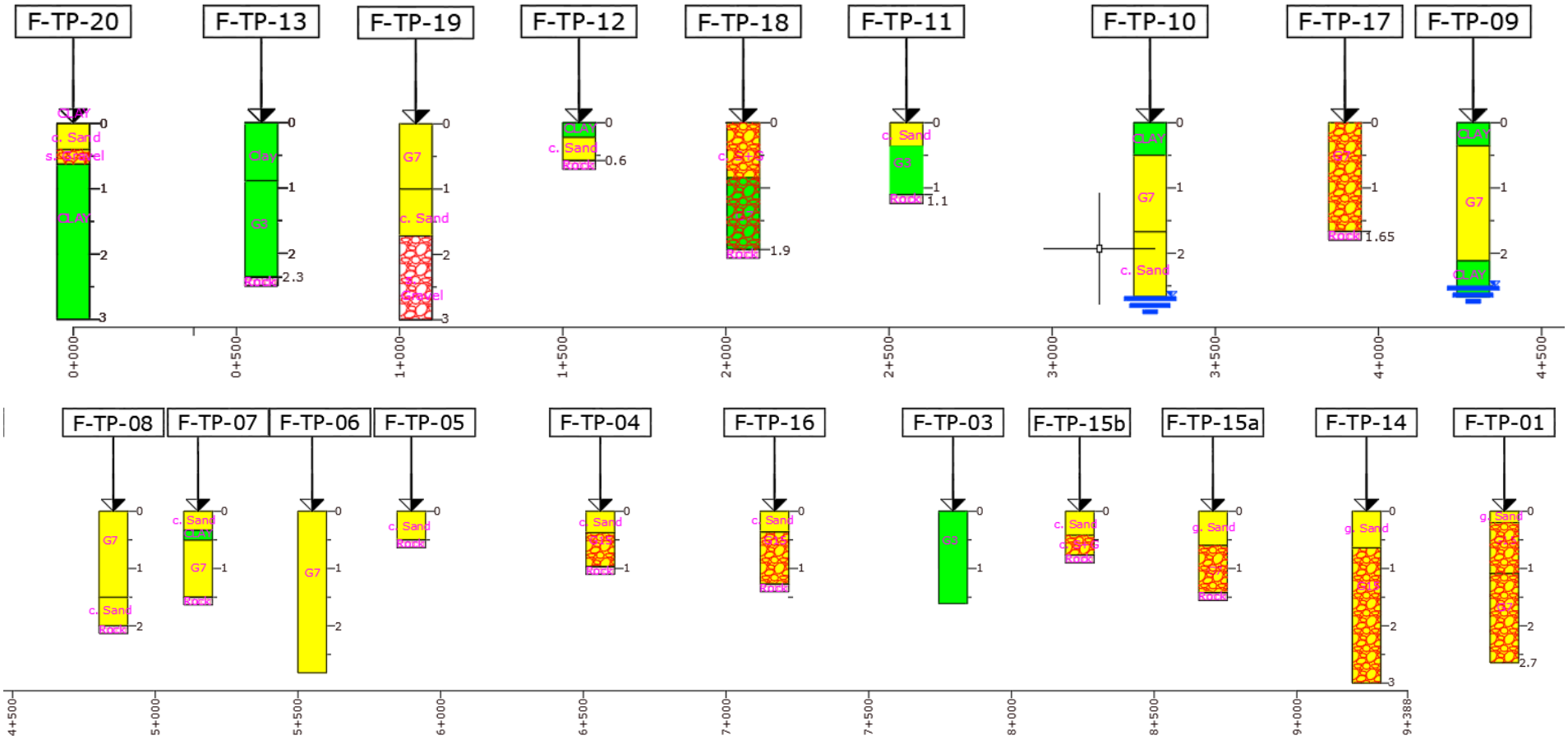
BUSWELU – NYAMADOKE – NYAMHONGOLO Road

- Test pits were excavated along the road alignment from F-TP-01 to F-TP-20.



- Test pits TP-01, TP-02, TP-04, TP-05, TP-06, TP-07, TP-08, TP-10, TP-11, TP-12, TP-14, TP-15a, TP-15b, TP-16, TP-17, TP-18 and TP-19 are showing that the layers consist of SAND with fines 13% to 30%.
- (St. 5+100 to 7+550): TP-04, the upper 0.9m is silty Sand with CBR 95% =15 followed by Rock. TP-05 shows gravelly silty sand in the upper 0.5m followed by Rock. TP-06 shows gravelly silty sand with CBR95% =13. At TP-12 (ST 1+150), the rock appears after 0.6m of gravelly silty Sand. Only scrapping of the upper 0.5m and refill with compaction of the ground is needed.
- Test pits TP-03, TP-09, TP-13 and TP-20 are consisting of CLAY with waste materials and roots as first layer followed by Sandy CLAY till the end of thew test pit except mid layer of TP-09 which consists of loose silty SAND.
- Test pits TP-14 to TP-20: the upper layer is silty Sand to depth 0.4m (TP-15b) to 1.6m (TP-17) with CBR 95%=7, followed by Gravel with CBR 95% from 8 to 9. Rock layer is encountered at depth 0.75m (TP-15b) to depth 1.9m (TP-18).
- In TP-19, the upper 1.0m silty Sand followed by 0.7m clayey Sand with some rubbish, then Gravel layer.
- In TP-20, the upper 0.75m Sand/sandy Gravel is followed by high (to 2.1m) to intermediate plasticity (PI=37 to 35) sandy Clay with CBR 95% = 7.
- The CBR at 95% is shown below with depth, almost all values are below 15, except the upper layer of TP-01, TP-02, and TP-14 &TP-16. The soil classification on the trial pit samples as per PMDM 1999 classification is shown below. It can be seen that 10% of the soil is classified as unsuitable in TP-20 (ST. 0+000) up to TP-13 (ST. 0+550), other soils are classified as G3 (15%), which contains mainly Clayey soils with high fines content and may not be suitable for improved subgrade fill, G7 (50%), and G15.

In addition**, Appendix A** shows the full lab test results for the soil for each test pit.



BUSWELU – NYAMADOKE – NYAMHONGOLO Road Test pits

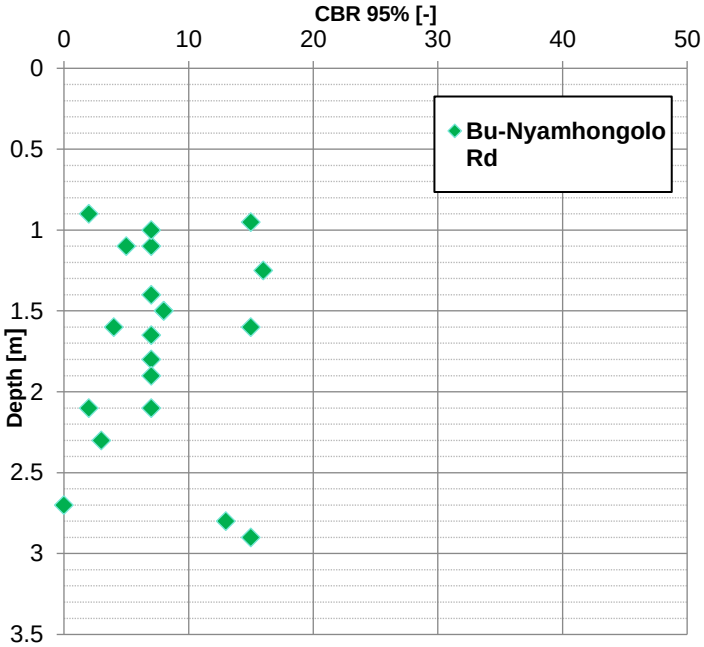
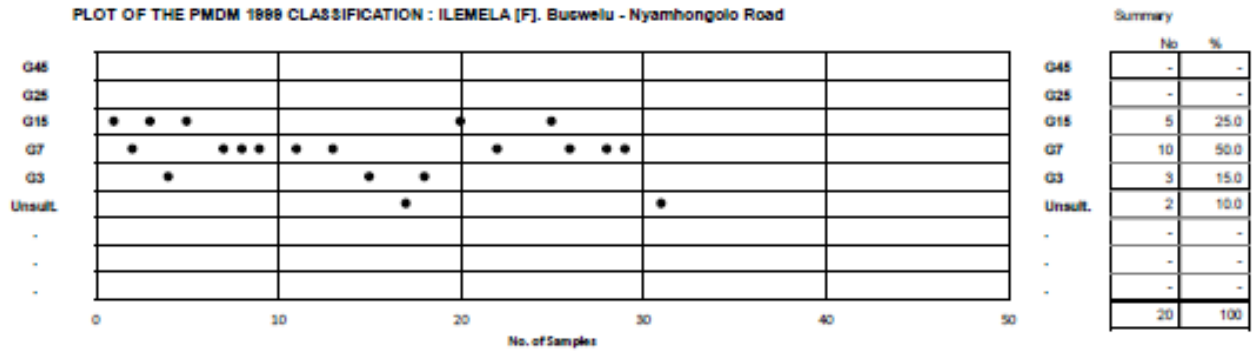


Figure 6: CBR distribution along the depth for NYAMHONGOLO Road



Atterberg Limits

Atterberg limits (liquid limit LL and plastic limit PL) tests were performed on soil samples collected from G-BH-01 to G-BH-04 at different depths. The obtained results show that the majority of clay samples are low to high plastic above the A-line

Tri-axial test

Three (3) UU tests were performed on the clay at different depths.

The values of the phi were ranging from 0 to 22.5 ^{o} and Cu value from 66.76 to 212.6 kPa.

Chemical test results

Chemical Tests were carried out on selected samples of soil and ground water including the water pH, sulphate (SO_4^{2-}) content and chloride (Cl-) content. The tests were performed according to 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.

- Groundwater samples in Ilemela area, pH varies from 7.05 to 7.61, CL- content varies from 27.5mg/L to 72.2mg/L, and sulphate content varies from 10.3mg/L to 45.3mg/L.
- Soil samples in Ilemela area, pH varies from 7.17 to 7.26, CL- content varies from 597.2mg/L to 702.5mg/L, and sulphate content varies from 1201.5mg/L to 1539mg/L.

The analyses of Exposure/Environmental Conditions and Durability Requirements for Concrete are provided in item 1.6 and 1.7.2.

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.

Based on the results of the recently carried out subsurface investigation, a gravelly SAND layer with a thickness varying between 4.0 to 5.0 m is found on the surface, followed by a layer of stiff sandy CLAY. The groundwater table is encountered at shallow depths as shown in Figure 1, while Table 1 shows the summary of the measured depth to water and permeability values within the area of Ilemela.

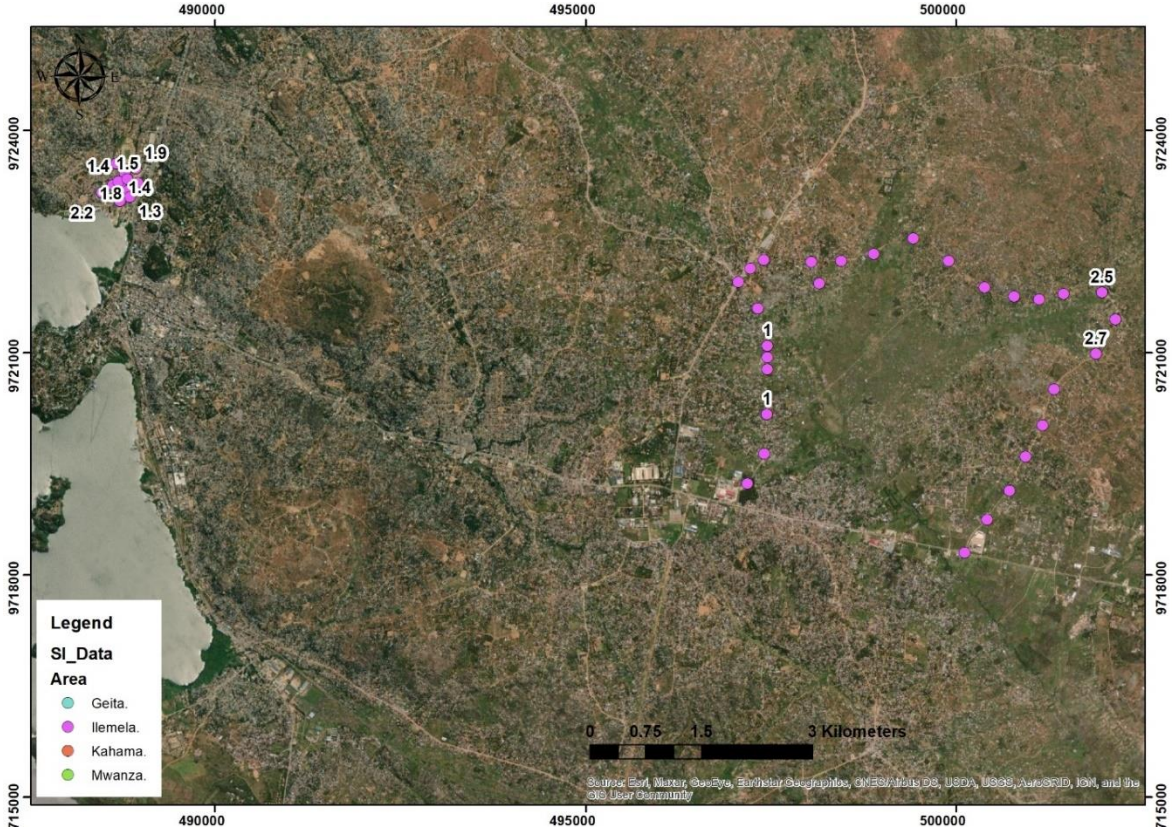


Figure 7: site investigation data carried out in Ilemela with the encountered depth to groundwater

Summary of the measured depth to groundwater and permeability in Ilemela

	Characteristic	Value
Depth to groundwater (m)	Average	1.64
	Min	1.00
	Max	2.70
Permeability (m/day)	Average	0.67
	Min	0.15
	Max	1.21

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 tests (BS EN ISO 22282-2) to determine the permeability of soils.

1.5 Basis for the Design

The selection of foundation type is based on the soil/rock conditions encountered at the Site and magnitude of structural stresses applied to the ground. Shallow foundations are proposed for the planned structures. The following section presents the design basis for shallow foundations.

Shallow Foundations shall satisfy the following criteria:

Stability Considerations: A minimum safety factor of 3 shall be considered to safeguard against the occurrence of a bearing capacity failure of the foundation soil under the imposed loads.

Serviceability Considerations: The settlement induced by the structural service loads should not impair the functionality of the structure. The total and differential settlements of shallow foundations shall be controlled within permissible limits. Using the calculated allowable bearing pressure value, the total settlement (short term + long term) for isolated/strip footing and raft foundation shall follow the ECP recommendations. However, BS EN 1997-1:2004+A1:2013 also stated that larger settlements may be acceptable provided the relative rotations remain within acceptable limits and that the total settlement does not cause problems with the services entering the structure. The allowable angular distortion as per BS EN 1997-1:2004+A1:2013 is 1: 500.

Due to the weak soil of the subsurface materials, relatively high fines content and very soft soils /loose and liquefiable sands, and for the structural safety and to avoid any excessive differential movement between the footings, the foundation soil is needed to be improved with a probable method to be defined in detailed stages. The improvement may include a soil replacement layer below the foundations or an improvement technique such as stone columns, or other relevant methods depending on the actual soil conditions and the applied stresses form the buildings.

Generally, shallow foundations are commonly used in the applications where ground conditions are suitable to withstand the average loads of typical low-rise buildings. The below figure shows some types of shallow foundations

The use ops shallow foundation allow for limited excavation works and no requirements for specialist contractor but can be limited by the ground conditions to relatively low bearing capacities not suitable for high-rise buildings and long span structures.

The use of Deep foundations is limited to either weak soil condition or special applications such as deep basements, high uplift loads, high overturning moments, and high applied loading in high rise buildings.

Generally, the type of foundations is determined by the structural applied loads to design the most probable type and hence, the needed improvement system under the foundations.

1.6 Basis for the Design

This section presents the design basis for the foundations of various proposed structures, retaining walls, pavements, site class, and subsurface concrete.

Design Basis for Foundations

The selection of foundation type is based on the soil/rock conditions encountered at the Site and magnitude of structural stresses applied to the ground. Shallow and deep foundations are proposed for the planned structures. The following sections presents the design basis for shallow and deep foundations.

1.6.1 Shallow Foundation

Shallow Foundations shall satisfy the following criteria:

Stability Considerations: A minimum safety factor of 3 shall be considered to safeguard against the occurrence of a bearing capacity failure of the foundation soil under the imposed loads.

Serviceability Considerations: The settlement induced by the structural service loads should not impair the functionality of the structure. The total and differential settlements of shallow foundations shall be controlled within permissible limits. Using the calculated allowable bearing pressure value, the total settlement (short term + long term) for isolated/strip footing and raft foundation shall be within 25mm & 50mm respectively. However, BS EN 1997-1:2004+A1:2013 also stated that larger settlements may be acceptable provided the relative rotations remain within acceptable limits and that the total settlement does not cause problems with the services entering the structure. The allowable angular distortion as per BS EN 1997-1:2004+A1:2013 is 1: 500. However, for machinery sensitive foundations, the angular distortion could be reached 1: 750.

Foundation depth: The foundation shall be embedded not less than 1m under the ground surface and rested on a replacement layer of 0.5m to 1.0m thickness consists of gravel or crushed stone.

Bearing Capacity Calculation for Shallow Foundation on Soil

Bearing capacity failures are rarely observed in foundation design. This is mainly due to the following main factors:

settlement mainly governs the foundation design, the limitation of the settlement to limit tolerable limits and/or allowable angular distortions in the superstructure;

the Factor of Safety of 3 that is relatively high and thus allowing for sufficient margin of safety;

the minimum footing sizes also enhance the stability of the foundation

The ultimate bearing capacity of the foundation soils under the structure's shallow foundations can be estimated using Meyerhof (1963) equation:

$$q_{ult} = cN_c s_c d_c + \bar{q}N_q s_q d_q + 0.5\gamma BN_\gamma s_\gamma d_\gamma$$

The allowable bearing capacity = $\frac{qult}{FS}$ with (FS = 3.0)

Where:

c: undrained shear strength

$\bar{q}$: the effective overburden (γD)

B: the width of foundation

D: the embedment depth

γ: the Effective unit weight (submerged unit wt. if below water table) of soil

N_c, N_q, N_γ: the Bearing Capacity factors

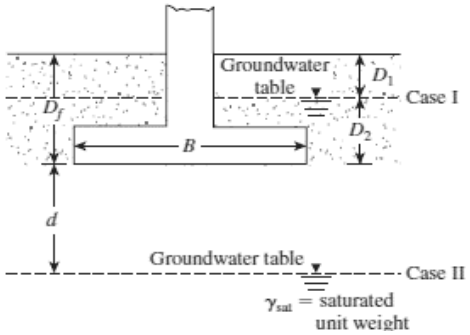
d_c, d_q, d_γ: the Depth factors

s_c, s_q, s_γ: the shape factors.

The first term accounts for the cohesive shear friction of the soil located below the footing.

The second term accounts for the soil located above the bottom of the footing. The term γ x D represents a surcharge pressure that helps to increase the bearing capacity of the footing.

The third term accounts for the frictional shear strength of the soil located below the footing.



The embedment depth D is computed considering the water level with respect to the foundation's bottom level. As show in Figure 4.1 below, two cases can be considered:

i. Case I- If the water table is located at a depth D1 so that $0 \leq D1 \leq Df$, the factor γD in the bearing capacity equations take the form

$$\gamma D = \gamma D_1 + (\gamma_{sat} - \gamma_w) D_2$$

Where,

γ_{sat}: the saturated unit weight of soil

γ_w: the unit weight of water

D_2 is equal to D_f-D_1

ii. Case II- If the water table is located at a depth d below the foundation level so that$0 \leq d \leq B$, the term γD will take the form:

$$\gamma D = \gamma D_f$$

Settlement Calculation of Shallow Foundations

The total and differential settlements of shallow foundations shall be controlled within permissible limits given in the standards. As per BS EN 1997-1:2004+A1:2013, settlements is acceptable provided the relative rotations remain within acceptable limits and that the total settlement does not cause problems with the services entering the structure.

A maximum relative rotation (angular distortion) of 1/500 is acceptable for the structures under service loads.

For foundations rested on one layer (infinite depth)

$$\Delta = \frac{q.B'.(1-\mu^2).I}{E_s}$$

Where:

q: net allowable bearing capacity

B': equivalent diameter of the foundation width

□: poisson ration = 0.3

I: shape & stiffness factor (I =1.12 for square flexible footing)

E_s: Deformation modulus

For foundations rested on multilayers, the settlement is:

$$\Delta = \sum \frac{\sigma}{E_s}.h_z$$

Where:

□: applied stresses at middepth of the layer

h_z: depth of layer

For Settlement due to consolidation in cohesive material

$$\Delta H = \frac{c_c}{1+e_o}.H.\log\frac{\sigma'_{vo}+\Delta\sigma_v}{\sigma'_{vo}}$$

Where:

c_c: compression index, $c_c = 0.007(W_L - 10)$ for overconsolidated clay and $c_c = 0.009(W_L - 10)$ for normal consolidated clay

e_o: initial void ratio

□ $'_{vo}$: overburden pressure at the mid clay layer

□□$_v$: additional applied stresses at the mid clay layer

Iterative process of the Detailed Settlement Analysis

In order to evaluate the foundation behaviour under the anticipated structural loads, an iterative process is carried out by the structural and geotechnical engineers. The detailed settlement analysis is conducted in 4 steps:

Step 1: the Structural Engineer conducts a finite element computer analysis of the foundation using the Geotechnical Engineer's best estimate of the modulus of subgrade reaction "K". In the first analysis a uniform value of "K" is used over the entire foundation footprint.

Step 2: using the structural load distributions from Step 1, the Geotechnical Engineer calculates the soil settlement at each node of the foundations. A new modulus of subgrade reaction is computed at each node.

Step 3: using the geotechnical modulus of subgrade reaction computed for each node in Step 2, the Structural Engineer conducts a new analysis, and a new pressure distribution is obtained.

Step 4: the Geotechnical Engineer computes new settlements at each node using the pressure distributions from Step 3, and the "K" values are refined accordingly.

Allowable settlement and angular distortion values

The total and differential settlements of shallow foundations shall be controlled within permissible limits given in the standards. As per BS EN 1997-1:2004, the allowable settlement is 25mm for isolated footings and 50mm for rafts. However, BS EN 1997-1:2004+A1:2013 also stated that larger settlements may be acceptable provided the relative rotations remain

within acceptable limits and that the total settlement does not cause problems with the services entering the structure foundation design for buildings.

1.7 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.

Ilemela Municipality

The chemical composition test results of soil and groundwater samples obtained from test pits and boreholes drilled at the project location reveal high levels of sulphates and chlorides in the tested soil samples and low levels of sulphates and chlorides in the tested groundwater samples with neutral pH levels, as summarized in the below table.

	Soil Samples			Water Samples		
	Chlorides (as Cl), (mg/l)	Sulphates (as SO4), (mg/l)	pH	Chloride (as Cl), (mg/l)	Sulphate (as SO4), (mg/l)	pH
Min.	597.2	1201.5	7.17	27.5	10.5	7.05
Max.	702.5	1539	7.26	72.2	45	7.61
Average	632.3	1370.23	7.22	55.32	27.51	7.37
Adopted in Analysis*	702.5	1,539	7.26	72.2	45	7.61
Count	3	3	3	10	10	10

The foundations and other substructure concrete elements are anticipated to be in contact with shallow groundwater. Considering the above test results and the shallow groundwater, the exposure conditions are defined as follows:

- BS 8500: XD2/ DC2 (DS-2/AC-2)
- BS EN 206: XD2/ XA1

The protection measures for the foundation and other substructure concrete elements in contact with soil/groundwater to ensure very dense and durable concrete against potential chemical and chloride attacks are as in item 1.8.2 below.

1.8 Geotechnical Recommendations

Based on the mentioned in the above section, the following recommendations shall be followed.

1.8.1 Foundation Recommendations

- Shallow Isolated Footing connected with ground beams and/or continues footing are adopted as foundations for the proposed project.
- The appropriate foundation depth would be chosen at a depth not less than 1.50m below the ground level.
- Due to the relatively high fines content, and for the structural safety and to avoid any excessive differential movement between the footings, excavation should extend to a satisfying depth below the foundation level.
- The bottom of excavation is to be flooded by water for at least 48 hours. Any loose layers fill materials, soft spots, and any inferior materials such as broken or loose rocks or gypsum

at the excavation level should be totally removed and replaced by an approved material, and as directed by the Engineer.

- The excavation level should be well compacted to its maximum dry density using heavy vibratory roller of a static weight of not less than 15 tons, under the supervision of a competent Geotechnical engineer.
- An approved replacement backfill material (replacement layer of 1.5m thickness (and 1.0m thickness for underground tank) consists of a mixture of gravel and sand (1 Sand: 1 Gravel) should be then placed in compacted layers of maximum thickness of 200mm (at least 95% of its maximum dry density as per modified Proctor test), from the excavation level to reach the foundation level with a protrusion not less than the replacement layer thickness.
- The footings are to be connected with ground beams in both directions (if applicable) at the foundation level.
- 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 guarantee safe excavation side slopes not steeper than 2.0 Horizontal: 1 Vertical.
- If the ground water is encountered during the 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 levels by a minimum of 0.50 m to enable inspection, cleaning and casting of concrete in the dry, The dewatering system is to be designed by the Contractor to ensure that there is no migration of fines and sand particles during the dewatering procedures.
- The Contractor should provide standby equipment on the project site for immediate operation to maintain dewatering on a continuous basis in the event that any part of the system becomes inadequate or fails.
- The dewatering system is to be designed to ensure that there is no migration of fines and sand particles during the dewatering procedures.
- Dewatering works shall be carried out in accordance with project specification. Contractor shall undertake all necessary temporary works to accomplish dewatering without damaging site improvements adjacent to excavation.
- The Contractor shall ensure that all diversions of existing utilities are carried out prior to excavation and to the approval of Engineer.
- Field and laboratory tests are to be conducted to assure that each replacement layer achieving the specified required properties.
- In case of the GWT is higher than the foundation level, full tanking system (with retaining wall as a water barrier against water ingress) should be considered.
- The maximum net allowable bearing pressure at the proposed foundation level is 150.0kPa for the buildings & 80kPa for underground tank.

1.8.2 Protection Measures for the Foundation

- From durability perspective, a minimum compressive strength Grade of C35/45 (cylinder/cube) is required.
- Portland cement conforming to BS EN 197-1 Type CEM I 42.5N, C3A content between 5% and 8%, shall be used in the concrete mix in combination with either fly ash (21% to 35% of cementitious weight), GGBS (36% to 65% of cementitious weight) or Silica fume (5% to 10% of cementitious weight).
- Maximum water to cementitious ratio of 0.4.
- Minimum Cementitious Content of 380 kg/m^3.
- The concrete shall be dense and durable with “Low” permeability level, satisfying minimum two test requirements out of the below specified requirements:

- Water Absorption of 2.0% maximum when tested according to BS 1881: Part 122 standard.
- Depth of penetration of 15mm maximum when tested according to BS EN 12390-8 standard.
- Chloride Ion Penetration of 2,000 Coulombs maximum when tested according to ASTM C1202.

- Minimum cover to reinforcement of 55mm for concrete in contact with blinding or prepared ground and 100 mm for concrete in direct contact with soil/groundwater.
- The application of full tanking waterproofing membrane protection is necessary for surface protection of buried concrete elements.

1.8.3 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%.

2 PAVEMENT DESIGN

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)
Ilemala	Buswelu-Busenga-coca cola road	0.3
	Buswelu to Nyamadoke (section -2)	2.4
	Nyamadoke to Nyamhongolo (section 1)	0.8

2.3 Pavement Design

According to Tanzania, Pavement and Materials Design Manual issued in 1999, Chapter, Environment. Ilemela city is set to be located at Moderate Region.

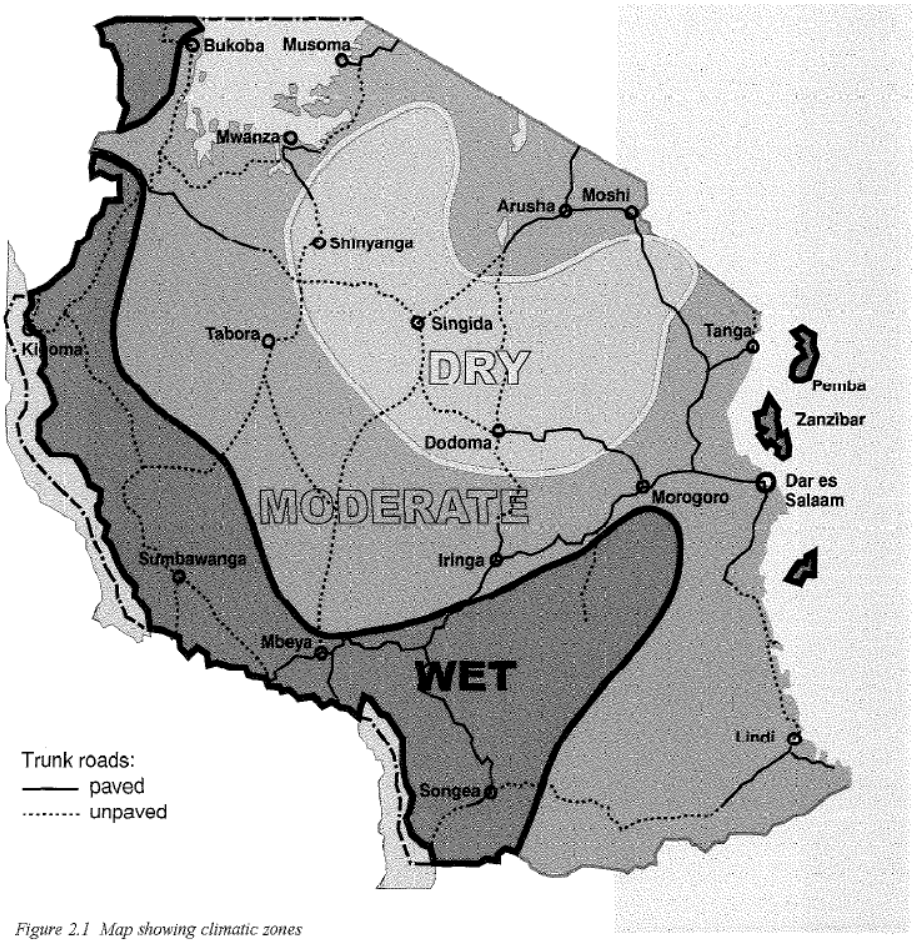


Figure 2.1 Map showing climatic zones

For the Buswelu-Busenga-Coca Cola (BBC) Road, the Buswelu to Nyamadoke (BN) (section -2), and Nyamadoke to Nyamhongolo (NN) (section-1), the assigned traffic volumes were 0.3, 2.4 and 0.8 million ESAL respectively.

The Tanzania Low Volume Roads manual of design chart 13.6 presented below were applied to Buswelu-Busenga-Coca Cola and Nyamadoke to Nyamhongolo roads respectively as the both roads receive less than 1 million ESAL traffic volume, the following thicknesses shall be adopted for the Aggregate base course and subbase course layers (assuming S 4 Subgrade category):

Buswelu – Busenga- Coca Cola (0.3 million ESAL):

- 175 mm Thickness of Aggregate Base G65
- 150 mm Thickness of Aggregate Subbase course G30

Nyamadoke to Nyamhongolo (0.8 million ESAL):

- 175 mm Thickness of Aggregate Base G80

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”.

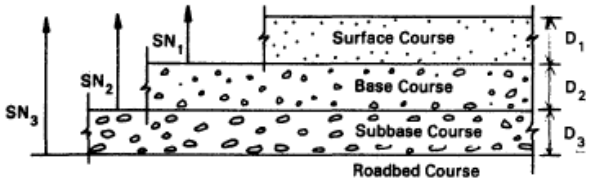
Table 2.2 Structural numbers for asphalt layer for wet areas as per LVRT 2016

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 for both roads is equal to SN1/a1 to be 78 mm and 92 mm respectively.



$$D^*_1 \geq \frac{SN_1}{a_1}$$

$$SN^*_1 = a_1 D^*_1 \geq SN_1$$

$$D^*_2 \geq \frac{SN_2 - SN^*_1}{a_2 m_2}$$

$$SN^*_1 + SN^*_2 \geq SN_2$$

$$D^*_3 \geq \frac{SN_3 - (SN^*_1 + SN^*_2)}{a_3 m_3}$$

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:

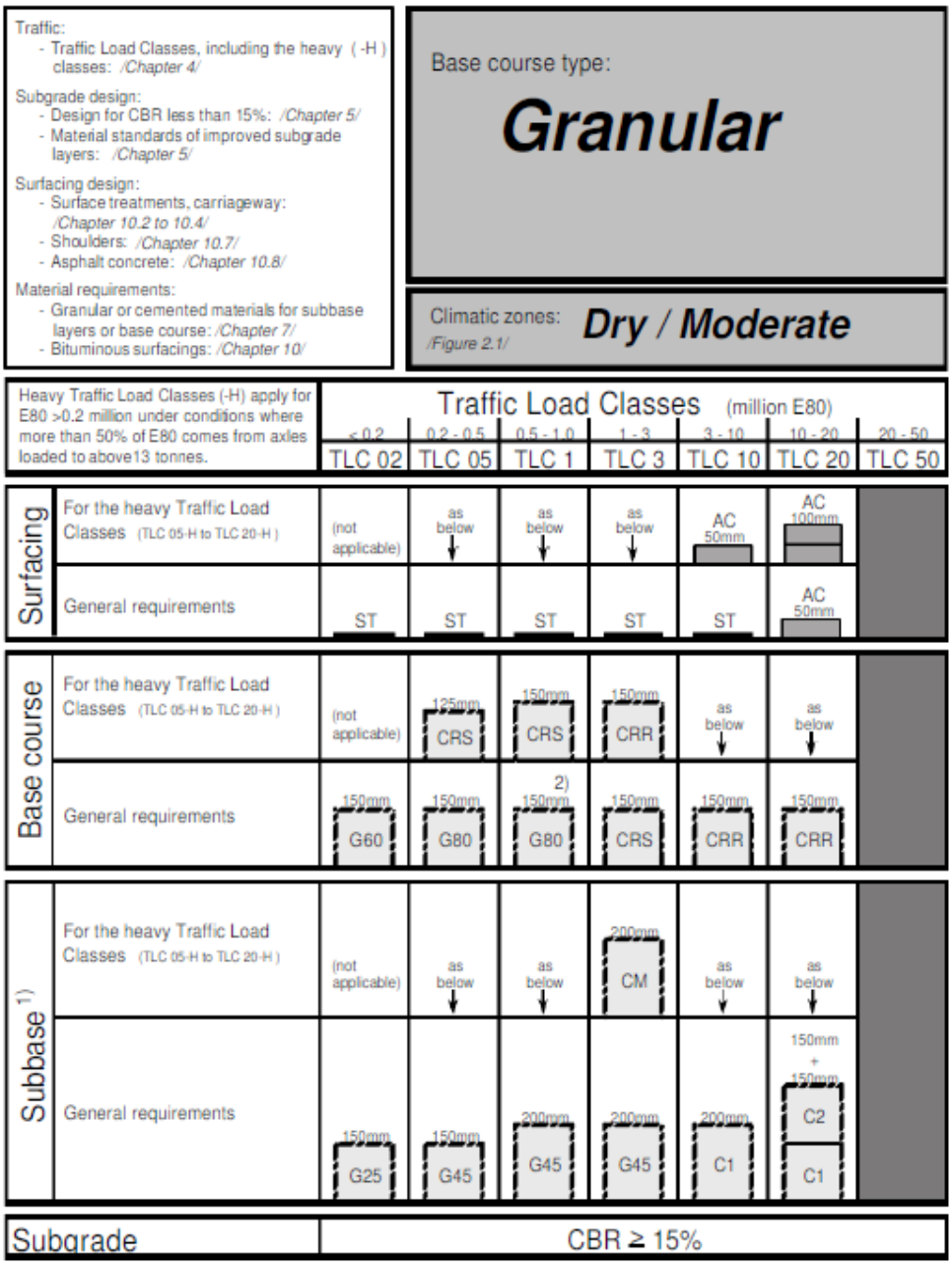
<u>Buswelu – Busenga- Coca Cola (0.3 million ESAL):</u>

- Bituminous Surface treatment
- 150 mm Aggregate Base course CRS, CRR
- 150 mm Aggregate Subbase Course G45

<u>Nyamadoke to Nyamhongolo (0.8 million ESAL):</u>

- Bituminous Surface treatment
- 150 mm Crushed Aggregate Base course CRR CRS
- 200 mm Aggregate Subbase Course G45

Table 8.4 Pavements with granular base course – dry or moderate climatic zones



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/*

As compromise between both design manuals and to adhere to the project quality finishes requirements, the following section is finally proposed:

Buswelu-Busenga-coca cola road (traffic volume 0.3 million ESAL)

- 50 mm Bituminous Wearing Course, AC-20
- Prime Coat. MC-30 (1 to 1.5 Litres/ Square Meter)
- 150 mm Granular Crushed Base Course CRR
- 150 mm Cement Stabilised Base C1
- 150 mm Upper Subgrade Layer G15, CBR>15%
- 150 mm Lower Subgrade Layer G7
- Variable thickness Fill, min. G3

Nyamadoke to Nyamhongolo (section -1) (traffic volume 0.8 million ESAL)

- 50 mm Bituminous Wearing Course, AC-20
- Prime Coat. MC-30 (1 to 1.5 Litres/ Square Meter)

- 150 mm Granular Crushed Base Course CRR
- 200 mm Cement Stabilised Base C1
- 150 mm Upper Subgrade Layer G15, CBR>15%
- 150 mm Lower Subgrade Layer G7
- Variable thickness Fill, min. G3

Regarding the Buswelu to Nyamadoke (Section-2) (Traffic Volume 2.4 million ESAL), only the Tanzania manual of Design is used with the following suggested section.

Buswelu to Nyamadoke (section -2) (traffic volume 2.4 million ESAL)

- 50 mm Asphalt Wearing Course
- 150 mm Crushed Aggregate Base course CRR
- 200 mm Cemented Base C1

However, as a measure to improve the quality of the required finish, a bituminous wearing course of 50 mm thickness is adopted in the design, then the final section will be similar to that one of Nyamadoke to Nyamhongo section

- 50 mm Bituminous Wearing Course, AC20
- Prime Coat, MC-30 (1 to 1.5 Litres/ Square Meter)
- 150 mm Granular Crushed Base Course CRR
- 200 mm Cement Stabilised Base C1
- 150 mm Upper Subgrade Layer G15, CBR>15%
- 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 Ilemela is to be improved 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:

Buswelu-Busenga-coca cola road:

- 0.5m improved subgrade layer consists of 150mm upper layer of G15 + 150mm lower layer of G7, then G3 fill (as directed by the Engineer for site adjustment): (St. ST. 1+600 to 2+000) & (ST. 2+450 to 3+000) 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 + 150mm lower layer of G7, then G3 fill (as directed by the Engineer for site adjustment): (St. 0+000 to ST. 1+150) & (ST. 2+000 to ST. 2+150) & (ST. 3+000 to ST. 3+216 (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.
- Part of the road (from ST. 1+150 to 1+600) shall be used: 0.50m replacement layer of rock fill is required overlain by 0.5m of improved subgrade consists of 150mm upper layer of G15 + 150mm lower layer of G7, then G3 fill (as directed by the Engineer for site adjustment) 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
- Part of the road (from ST. 2+150 to ST. 2+450) shall be used: 1.0m replacement layer of rock fill is required overlain by 0.5m of improved subgrade consists of 150mm upper layer of G15 + 150mm lower layer of G7, then G3 fill (as directed by the Engineer for site adjustment) 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. Rockfill shall be graded progressively from larger size (no greater than 200mm) at the lower point to a smaller

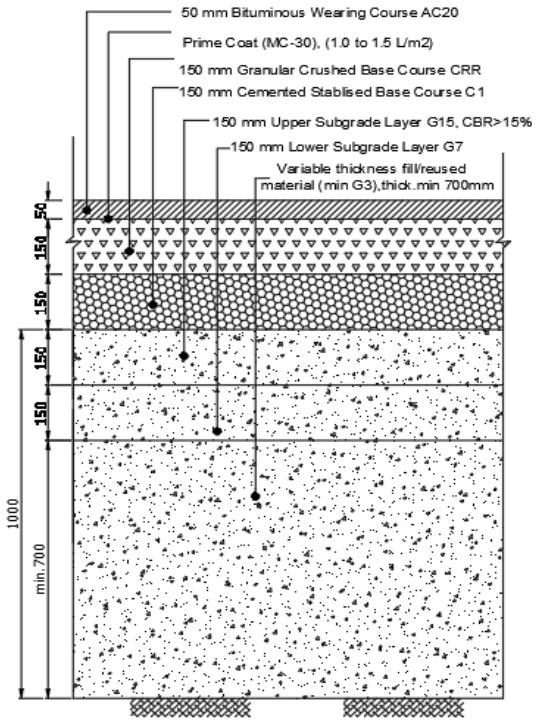
size (<80mm) at the higher point up to the improved subgrade fill layer. The voids are to be filled to the maximum practical extent by smaller particles

Buswelu to Nyamhongolo Road:

- 0.5m improved subgrade layer consists of 150mm upper layer of G15 + 150mm lower layer of G7, then G3 fill (as directed by the Engineer for site adjustment): (St. 1+150 to 2+800) 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 + 150mm lower layer of G7, then G3 fill (as directed by the Engineer for site adjustment): (St. 0+000 to ST. 1+150) & (ST. 2+800 to ST. 5+700) & (ST. 7+550 to ST. 8+050) 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.
- Part of the road (from ST 5+700 to 7+550) & (ST. 8+050 to 9+387 (End)) shall be scraped and compacted, no replacement is needed.
- Moreover, the following recommendations are to be considered before and during the construction of Ilemela roads:
- The excavation for the replacement fill 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.
- Rockfill shall be graded progressively from larger size at the lower point to a smaller size at the higher point up to the improved subgrade fill layer. The voids are to be filled to the maximum practical extent by smaller particles.
- 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, all sections introduced along the alignment of the roads are as follows:

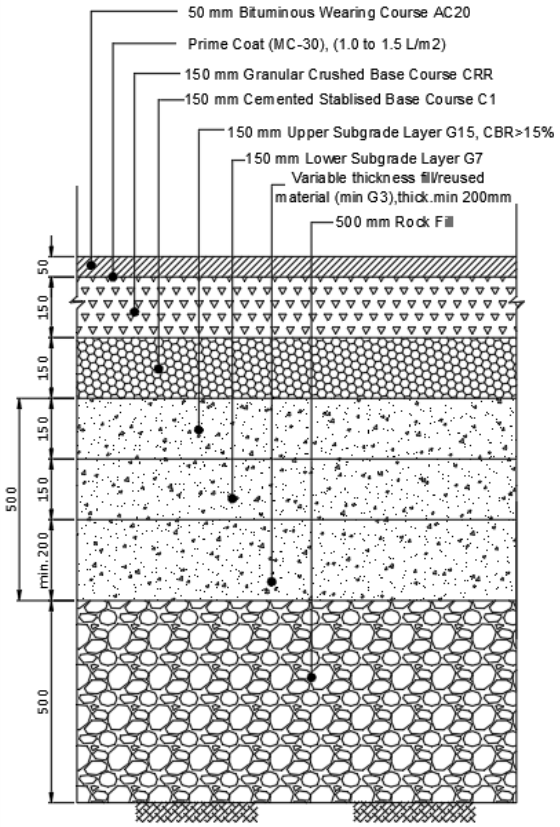
Buswelu-Busenga-coca cola road

Ilemela City:
Buswelu-Busenga-coca cola road
from ST. 0+000 to ST. 1+150
from ST. 2+000 to ST. 2+150
from ST. 3+000 to ST. 3+216 (End)

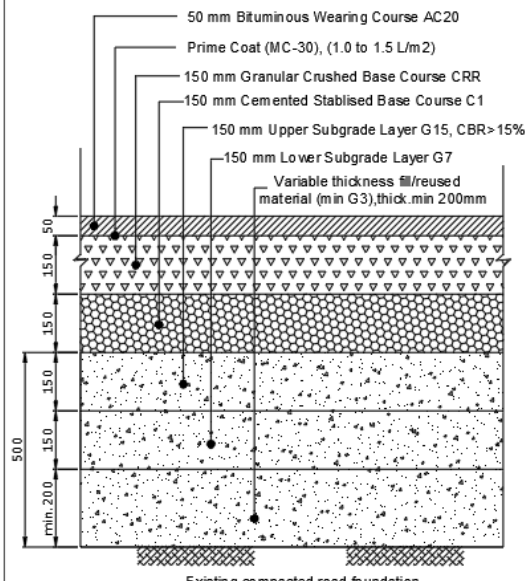


* Subgrade fill with protrusion 1.0m out of the subbase and slope 3 H: 1 V

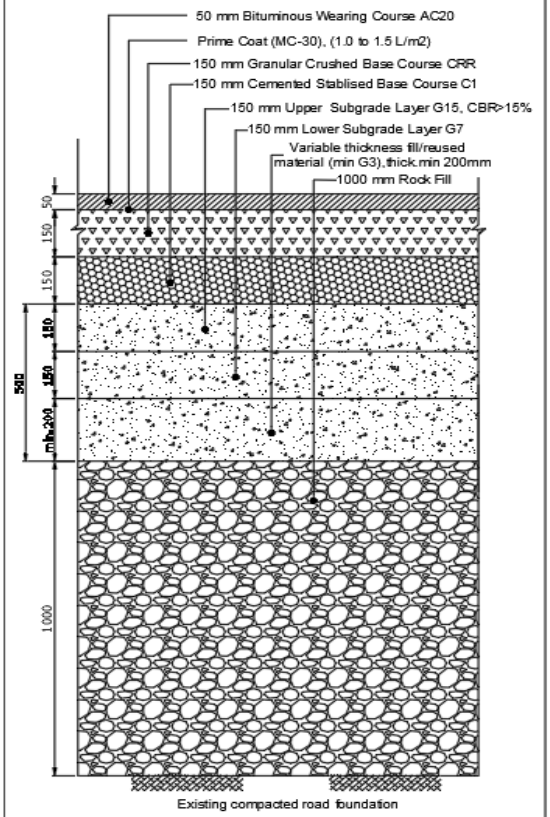
Ilemela City:
Buswelu-Busenga-coca cola road
from ST. 1+150 to 1+600



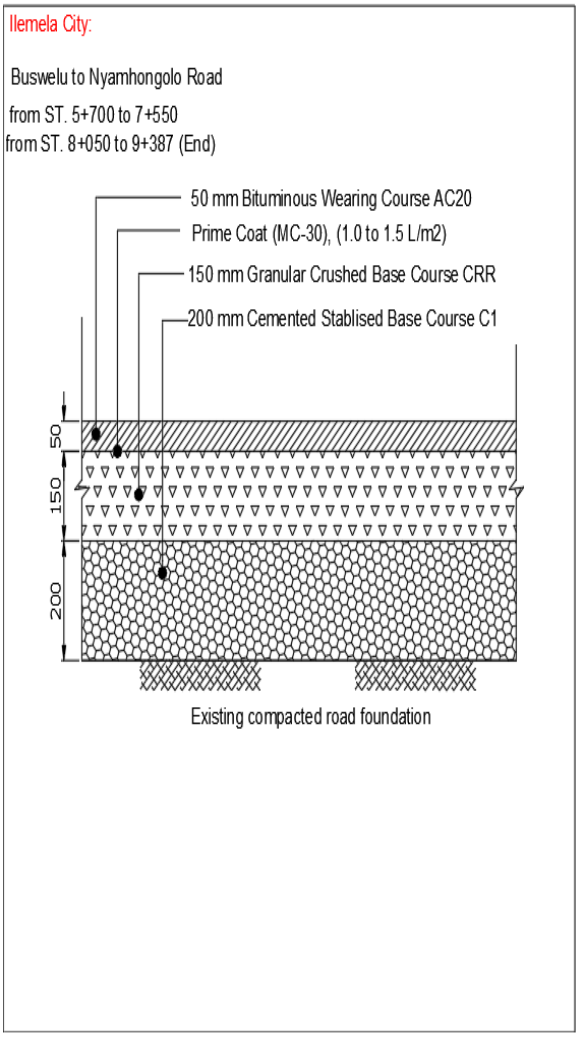
Ilemela City:
Buswelu-Busenga-coca cola road
from ST. 1+600 to 2+000
from ST. 2+450 to 3+000

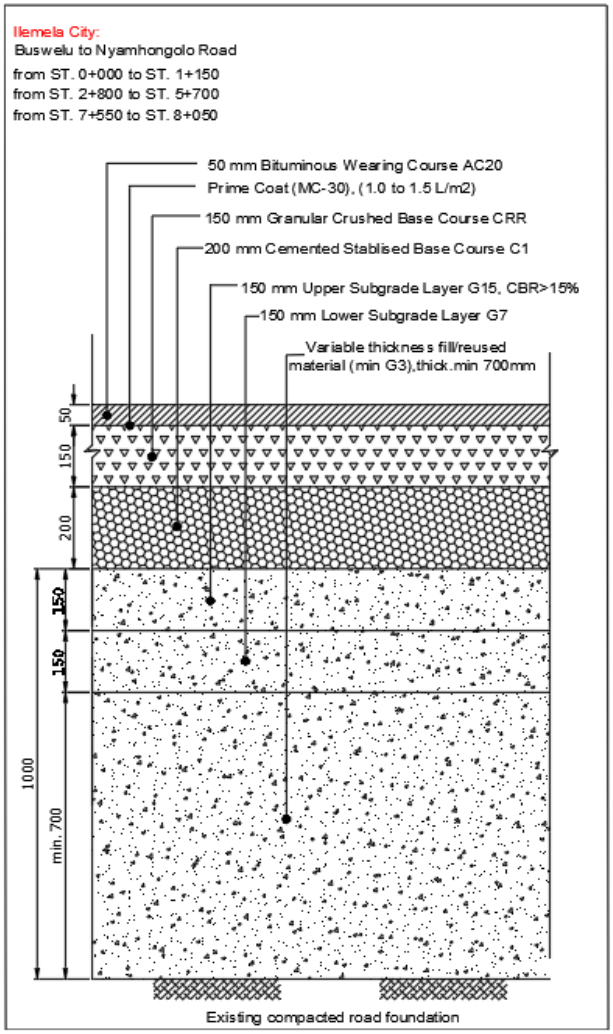


Ilemela City:
Buswelu-Busenga-coca cola road
from ST. 2+150 to ST. 2+450



Buswelu to Nyamhongolo Road





2.4 Material Source

A list of the coordinates of the material sources and estimated quantities is tabulated here 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 quarry.

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. The below figure and table shows the location and coordinates of the material sources in Mwanza and Ilemela area.

- 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.

Area	Easting	Northing	Estimated Quantity
GRAVEL SOURCES			
MWANZA ILEMELA Gravel - Ilalila	503,311.20	9,734,309.50	35000 - not Active
SAND SOURCES			
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
QUARRY / Rock Sources			
MWANZA ILEMELA Quarry - Bukandwe	516,050.20	9,716,745.10	285000 Active quarries
WATER SOURCES			
MWANZA ILEMELA – Lake Victoria	489,777.00	9,717,659.10	Lake

Figure 12: Sources of materials for Mwanza and Ilemela

Appendix IX: 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:.....Tittle.....

Address:.....

Mob. Phone..... E-mail:…….....

2. Who is complaining

i. Project Affected Persons (PAPs)..... ☐

Specific PAPs are:

- City staff..... ☐
- Labourer ..... ☐
- Representative of complainant. ☐
- 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 THE PROPOSED UPGRADING OF BUSWELU – BUSENGA – COCA COLA/MUSOMA ROAD (3.3KM) IN IGOMA WARD AND BUSWELU – NYAMADOKE – NYAMHONGOLO ROAD (9.5KM) LOCATED IN BUSWELU AND NYAMHONGOLO WARDS, ILEMELA MUNICIPALITY IN MWANZA REGION

PROPONENT:
ILEMELA MUNICIPAL COUNCIL (IMC)
P.O.B OX 735
MWANZA
Tel: + 255 736 200 910
Email: md@ilemelamc.go.tz Web: www.ilemelamc.go.tz

SUBMITTED TO:
The National Environment Management Council (NEMC)
Regent Estate, Plot No. 29/30
P.O. Box 63154, Dar es salaam, Tanzania
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Fax: +255 22 2774901
E-mail: dg@nemc.or.tz

CONSULTANT:
ROSEMARY C. NYIRENDA
Mobile: +255 713 030 865/ +255 753 880 424
Email: rosemary.nyirenda35@gmail.com

SUBMISSION DATE: 28TH MAY, 2023

NON-TECHNICAL EXECUTIVE SUMMARY

1. Title and location of the project/undertaking

Environmental and Social Impact Statement for the Proposed Upgrading of Buswelu – Busenga – Coca Cola/ Musoma Road (3.3km) in Igoma ward and Buswelu – Nyamadoke – Nyamhongolo Road (9.5km) located in Buswelu and Nyamhongolo wards, Ilemela Municipality in Mwanza Region.

2. Name of the proponent and contacts

Ilemela Municipal Council,

P. O. Box 735,

Mwanza, Tanzania.

Tel: +255 736 200 810

Email: md@ilemelamc.go.tz Web. www.ilemelamc.go.tz

3. Names and address of Firm of Experts conducted the EIA

ROSEMARY C. NYIRENDA

Mobile: +255 713 030 865/ +255 753 880 424

Email: 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 upgrading of Buswelu – Busenga – Coca Cola Road/ Musoma Road at Igoma (3.3 km) and Buswelu – Nyamadoke – Nyamhongolo Road (9.5km) in Ilemela Municipality as part of the Tanzania Cities Transforming Infrastructure and Competitiveness (TACTIC) project financed by the World Bank (WB). Despite the rapid growth of Ilemela Municipality with most of the areas well developed and occupied, there are some areas which are not easily accessible causing damage to vehicles and traffic on other roads. This is due to poor quality of roads that lack drains, wet in nature and have potholes whereby during rainy seasons, the areas flood and on dry seasons there is dust pollution. Buswelu – Busenga – Coca Cola Road/ Musoma Road (3.3km) and Buswelu – Nyamadoke – Nyamhongolo Road (9.5km) pass through Igoma and Nyamhongolo and Buswelu wards respectively. These wards are strategically located and a focal point for business activities in Ilemela Municipal and Mwanza Region in general therefore connecting them will improve the livelihood of the areas.

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, the upgrading Buswelu – Busenga – Coca Cola Road/ Musoma Road (3.3km) and Buswelu – Nyamadoke – Nyamhongolo Road (9.5km) passing through Igoma and Nyamhongolo and Buswelu wards respectively. The upgrading of Buswelu – Busenga – Coca Cola Road/ Musoma Road at Igoma (3.3 km) and Buswelu – Nyamadoke – Nyamhongolo Road (9.5km) is important because the road connects the Buswelu to Igoma (Coca Cola Road/ Musoma Road), critical in terms of economic impact and urban development while the later connects the Tanzania Strategic Cities Projects – Additional Financing 2 (TSCP – AF2) roads which connect with Musoma road, access to the newly constructed Ilemela bus terminal, serves significant number of communities and ease traffic. According to the Ilemela MC master plan, the RoW for Buswelu – Nyamadoke – Nyamhongolo Road is 50m i.e., 25m each side from center line of the road. The proposed roads will be constructed on the existing roads corridor that is owned by the government. The proposed roads to be constructed are near sensitive areas which are mostly human settlements, businesses, farms, raves as well as utilities such as TANESCO poles and water pipes which may be affected during project implementation and may require relocation and compensation. The municipal council is ready to relocate the affected utilities and compensate properties that may be affected.

The proposed project being a community service is projected to benefit a lot of people from different corners of Ilemela Muncipality and Mwanza Region who will use the road to travel from one place to another for several activities. Ilemela Municipal 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 Ilemela Municipality 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 stakeholders' 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), Ilemela Municipal Council, Mwanza Urban Water Supply and Sanitation Authority (MWAUWASA), Tanzania Elictric 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 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

7. 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 pregnancies

- Positive Environmental Benefits
    i. Improved environment which consists of standard drainage system
    ii. Improved air quality due to expected greenery

- 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 pregnancies

- 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

8. 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.

9. 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 Buswelu – Busenga – Coca Cola Road/ Musoma Road (3.3km) and Buswelu – Nyamadoke – Nyamhongolo Road (9.5km)). 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.

(b) Alternative Analysis for 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.

(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.

10. 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 Ilemela Municipal 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.

11. Resources evaluation

Ilemela Municipal Council has set aside a total of over 5.7 billion (Five billion and 7 million) Tanzanian shillings as initial cost for the improvement of Buswelu – Busenga – Coca Cola Road/ Musoma Road (3.3km) and Buswelu – Nyamadoke – Nyamhongolo Road (9.5km). 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. 145,0000,000 and TZS 84,500,000 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.

12. 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.

13. Summary and Conclusion

The proposed upgrading Buswelu – Busenga – Coca Cola Road/ Musoma Road (3.3km) and Buswelu – Nyamadoke – Nyamhongolo Road (9.5km) in Ilemela Municipality, Mwanza region. The project has large socio-economic benefits to both the Ilemela Municipality 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 BARABARA ZA BUSWELU – BUSENGA – COCA COLA/MUSOMA (KM 3.3) KATIKA KATA YA IGOMA NA BUSWELU – NYAMADOKE – NYAMHONGOLO (KM 9.5) KATIKA KATA ZA BUSWELU NA NYAMHONGOLO, MANISPAA YA ILEMELA, MKOANI MWANZA

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TAREHE YA KUWASILISHA: 28 MEI 2023

MUHTASARI USIO WA KIUFUNDI

1. Kichwa na eneo la mradi/shughuli

Tathmini ya Athari za Kimazingira na Kijamii kwa mapendekezo ya Uboreshaji Barabara za Buswelu – Busenga – Coca Cola/ Musoma (km 3.3) katika Kata ya Igoma Na Buswelu – Nyamadoke – Nyamhongolo (km 9.5) katika Kata za Buswelu na Nyamhongolo, Manispaa ya Ilemela, Mkoani Mwanza.

2. Jina la Mwekezaji na anwani

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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 za Buswelu – Busenga – Coca Cola/ Musoma katika Kata ya Igoma Na Buswelu – Nyamadoke – Nyamhongolo katika Kata za Buswelu na Nyamhongolo katika Manispaa ya Ilemela ikiwa ni sehemu ya mradi wa maboresho ya miundombinu na ushindani wa Miji Tanzania (TACTIC) unaofadhiliwa na Benki ya Dunia (WB). Japokuwa Ilemela ni Manispaa linalokua kwa kasi ikiwa maeneo yake mengi yameendelea na yametwaliwa, bado kuna maeneo hayafikiki kirahisi hivyo kusababisha uharibifu wa vyombo vya usafiri, foleni kwenye barabara zinazopitika. Hii ni kutokana na kutokuwa ubora sababu ya mashimo, sehemu ya barabara hizo ni oevu na hakuna na mifereji ya maji ya mvua hivyo kupelekea mafuriko kipindi cha mvua na vumbi kipindi cha kiangazi. Barabara za Buswelu – Busenga – Coca Cola/ Musoma (3.5km) na Buswelu – Nyamadoke – Nyamhongolo (9.5km) zinapita katika kata za Igoma na Nyamhongolo na Buswelu mtawaalia. Kata hizo ni sehemu ya muhimu inayoangaliwa na Manispaa ya Ilemela na mkoa wa Mwanza kwa ujumla hivyo uunganishwaji wake utainua maisha ya wakazi wa maeneo hayo.

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 za Buswelu – Busenga – Coca Cola/ Musoma (3.5km) na Buswelu – Nyamadoke – Nyamhongolo (9.5km) zinazopita kwennye kata za Igoma na Nyamhongolo na Buswelu. Barabara hizi ni muhimu sababu inaunganisha arabara ya Buswelu mpaka Igoma, ina athari za kiuchumi na maendeleo ya mji na barabara nyingine inaungana na barabara za mradi wa TSCP – AF2 ambayo inaungana na Barabara ya Musoma, kuelekea kwenye stendi mpya ya mabasi Ilemela ambayo ina hudumia jamii nyingi na kupunguza foleni. Kulingana na mpango mkuu wa Manispaa; haki ya njia ya barabara ya Buswelu – Nyamadoke – Nyamhongolo ni mita 50 ambapo ni mita 25 kila upande kuanzia katikati ya barabara. Barabara hizo pendekezwa zitajengwa kwenye nafasi iliyopo inayomilikiwa na serikali. Barabara hizo tarajiwa zinapita maeneo ambayo ni nyeti kama makazi ya watu, biashara, mashamba, makaburi pamoja na miundombinu ya kama nguzo za TANESCO na mabomba ya maji ambayo yanaweza kuathiriwa kipindi cha utekelezaji wa mradi na inaweza kuhitaji kuhamishwa na kupewa fidia. Halmashauri ya manispaa iko tayari kuhamisha miundimbinu itakayoathiriwa na kulipa fidia kwa mali zitakazo athirika.

Kwa kuwa mradi huu pendekezwa ni huduma ya jamii hivyo unatarajiwa kuleta faida kwa watu wengi kutoka kona mbalimbali za manispaa ya Ilemela na Mkoa wa Mwanza ambao watatumia barabara kusafiri kutoka sehemu moja kwenda nyingine kwa shughuli mbalimbali. Halmashauri ya Manispaa ya Ilemela, Wizara ya Fedha, TAMISEMI na Sekta ya Uchukuzi na Idara ya Kazi ndio wahusika wakuu katika uandaaji na usimamizi wa fedha kabla na wakati wa ujenzi. Mradi unaopendekezwa utahudumia wakazi wa Halmashauri ya Manispaa ya Ilemela 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 Taifa 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 ilivyorekebishwa 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 Manispaa ya Ilemela, 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 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 zinazorekebishika.

(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 shughuki za ujenzi.

• 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 yaliyoboreshwa 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

• 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. Kuongeza 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 yaliyoboreshwa 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. Unyunyizaji 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 zitanyunyiziwa 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 Manispaa ya Ilemela. 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 wakati wa operesheni**: Kampuni ya kibinafsi ya usafi yenye idadi ya kutosha ya wafanyakazi itaajiriwa kusafisha barabara 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 Buswelu – Busenga – Coca Cola/ Musoma (3.5km) na Buswelu – Nyamadoke – Nyamhongolo (9.5km)). 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.

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 Manispaa ya Ilemela (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 Manispaa ya Ilemela itafanya ukaguzi wa kawaida na kuwasilisha taarifa ya ukaguzi kwa uongozi wa juu ili kuhakikisha uendelevu wa mfumo wa usimamizi wa mazingira.

10. Tathmini ya rasilimali

Halmashauri ya Manispaa ya Ilemela imetenga jumla ya zaidi ya shilingi bilioni tano na milioni saba (bilioni 5.7) za kitanzania kama gharama za awali za uendelezaji na ujenzi wa Buswelu – Busenga – Coca Cola/ Musoma (3.5km) na Buswelu – Nyamadoke – Nyamhongolo (9.5km). 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 145,000,000.00 na 84,500,000.00 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 Buswelu – Busenga – Coca Cola/ Musoma (3.5km) na Buswelu – Nyamadoke – Nyamhongolo (9.5km) katika Manispaa ya Ilemela, Mkoa wa Mwanza. Mradi huo una manufaa makubwa ya kijamii na kiuchumi kwa halmashauri ya Manispaa ya Ilemela 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.