

**ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR THE
PROPOSED UPGRADING OF 10.6KM ACCESS ROADS AT THE
CENTRAL BUSINESS DISTRICT AND THE REHABILITATION OF
3KM STORMWATER DRAINS IN KAHAMA MUNICIPALITY,
SHINYANGA REGION**

FINAL REPORT

PROPONENT:

KAHAMA MUNICIPAL COUNCIL
P.O.B OX 472, KAHAMA
Tel: +255 282710032/ +255719679464
E-mail : md@kahamamc.go.tz / info@kahamamc.go.tz
Web: www.kahamamc.go.tz

SUBMITTED TO:

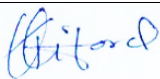
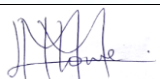
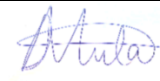
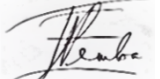
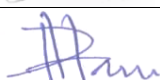
The National Environment Management Council (NEMC)
Regent Estate, Plot No. 29/30
P.O. Box 63154, Dar es Salaam, Tanzania
Tel: +255 22 2774889 or +255 22 2774852
Fax: +255 22 2774901
E-mail: dg@nemc.or.tz

CONSULTANT:

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

SUBMISSION DATE: 14TH JULY, 2023

ESIA STUDY TEAM

S/N	Name	Position	Registration	Signature
1.	Rosemary C. Nyirenda	Environmental Expert and ESIA Team Leader	NEMC/PC/EIA/2021/0075	
2.	Magdalena L. Mlowe	Environmental Specialist		
3.	Dr. Lilian G. Mulamula	Ecologist		
4.	Dr. Edmund Temba	Legal and Policy Framework		
5.	Dorcas Ephraim	Economist		

EXECUTIVE SUMMARY

The Final Environmental Impact Statement (EIS) for the Proposed Upgrading of 10.6km Access Roads at the Central Business District and the Rehabilitation of 3km Stormwater Drains in Kahama Municipality, Shinyanga Region

Proponent: Municipal Council Director, Kahama Municipal Council

Background and Location

Kahama Municipal Council was established on January, 2021 after being officially declared as a Municipal Council on Government Notice NO.174 under the Local Government (Urban Authorities) Act, (CAP.288) by the Order Made under Section 5 (3). Kahama Municipal Council is located in the North-Western plateau of Tanzania. It lies approximately 3° 15" and 4° 30" South of the Equator and Longitudes 31° 30" and 33° 00" East of the Greenwich meridian. It is found along the Isaka-Benako-Rusumo trunk road, about 986.12 Kilometers from Dar es Salaam, 267 Kilometers from Mwanza, and 109 Km from Shinyanga Town. Kahama Municipal Council borders Nzega District to the East, Msalala District Council to the North. Bukombe and Mbogwe to the West and Ushetu District Council to the South.

The Projects

Kahama 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 Associations (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. Kahama Municipal Council is grouped in Tier 1 as among the 12 larger, fast-growing LGAs.

The TACTIC project will provide funding to cover for the following projects in Kahama:

- 1) Improve infrastructures at Zongomela Industrial Park (roads, market and bus stand)
- 2) Upgrading of 10.6 km Access Roads at CBD
- 3) Construction of New Bus Terminal and improvement of Sango Market
- 4) Rehabilitation of 3km Stormwater Drains

The scope of this report is Upgrading of 10.6 km Access Roads at CBD and Rehabilitation of 3km Stormwater Drains in Kahama Municipality.

Brief Description of Project Environment

Components 1: Upgrading of 10.6km CBD Roads

Kahama Municipal Council's roads are mostly constructed in the areas which were once used for agriculture activities especially growing of paddy. Therefore, most of the habitants and roads are either flooded or waterlogged during the rainy season. Kahama Municipal Council's aim is to link roads at CBD with existing tarmac roads. The project plans to construct 10.6 Km of roads at CBD these roads are: Mikaratusini 415m, Vumilia 380m, TASAF 110m, Market

180m, Unyamwezini 420m, Namanga 370m, Muslim 490m, KKKT 168m, Chizi 155m, Shoo 135m, NHC 290m, John Wagi 207m, Mkonge 206m, Machage 350m, Manyovu 350m, Mahongo 270m, Majani-Mapana 150m, Royal 385m, Mama Farida 1,330m, Isaka Road 3500m.

Component 2: 3.6km Stormwater drains

Apart from the roads network the project will undertake the construction of the 3km storm water drain. Storm water management system in Kahama Municipality is required to provide protection for the natural feature and manmade development. Currently, the storm water drainage systems consist of natural drains i.e., valley and constructed open channels along the road network. Most of the roads in Kahama Municipality have unlined drainage channels but only few parts of roads have lined drainage system. Topographical nature of Kahama Municipality is gentle sloping in several areas which facilitates flow of storm water from one place to another but also there are flat areas in few parts which cause water deposition during rainy season.

From the household survey reveal that 13% of households have drainage system within their areas while 87% of the total households have no drainage system within their areas. Therefore, due to lack of drainage system in some areas and poor drainage system in some parts in Kahama Municipality has resulted into the occurrence of flood in Nyasubi and Mhungula sub wards. Due to lack of proper sewerage systems, the storm water drains and open ditches acts as sewerages systems through which the domestic waste water is channelled. Poor storm water drainage systems along the roads. Not all roads in Kahama Municipality are provided with storm water drainage systems, which help to direct storm water to the proper channel, hence prevent roads from deteriorating and also prevent floods from affecting other land uses, hence the need to improve roads at the Kahama Municipal.

Areas such as Chelsea Street at Mhongolo Ward, Igomelo Street –Malunga Ward and Sokola Street –Majengo are said to require immediate attention. The construction of the 3km is selected out of the total 13.5km of the storm water drain that passes though Kahama Municipal Council and are in need of construction. The wards which the storm water drain passes include Kahama CBD-4 Km, Majengo 3 Km, Nyahanga Km 2, Mhongolo Km 1.5, Nyasubi Km 2 and Mhungula Km 1.

Policy and Legal Framework

The policy framework which are in conformity with the proposed project activities are environmental policy of 1997, land policy of 1997, gender policy of 2000 and HIV and AIDS Policy of 2001. The legal framework for the proposed projects includes the environmental management Act of 2004, and its Regulations, the Land Act of 1999, The Occupational Health and Safety Act of 2005, HIV and Aids Act of 2008. 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.

Project Stakeholders and their involvement in the ESIA Process

List of stakeholders consulted included: i). Kahama District Council including the District Executive Director and the entire team (legal, community development, environment, physical planning, engineering), ii). Kahama Urban Water Supply and Sanitation Authority (KUWASA), iii). TANESCO, Kahama Office, iv). Association of people with disabilities, v). Association of traders along the proposed roads, vi). Representatives of the Association of taxi drivers parking in various points along the proposed roads, vii). Office of the Mayor of Kahama Municipal Council, viii). Mini bus stand users, ix). All wards where the proposed roads are passing, x). All mtaa officers where the proposed roads are passing, xi). Communities in all areas where the proposed roads are passing

Results of Public Consultations

The following issues rose by stakeholders,

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

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

-Compensation of affected properties; Even though the proposed road shall maintain the same existing alignment, 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

-Jobs creation to be considered for the locals in order to improve the local economy. This will be important as Kahama Municipal Council has enough number of semi-skilled and unskilled labourers to work in the project for the entire period.

Potential Significant Environmental and Social Impact

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

Social positive Impacts during pre-construction phase;

- Job creation and increased income

Social Positive Impacts during construction phase;

- Job creation for local communities and others
- Increased income to local communities due to employment and selling of foods and goods in the construction areas

Social Negative Impacts during construction phase

- Safety and health risks of surrounding communities and construction workers
- HIV/AIDS transmission between construction workers and local communities

Environmental Negative Impacts during construction phase

- Disruption of other infrastructure
- Soil erosion and instability of slopes
- Increased water and soil Pollution
- Noise, vibration and air pollution
- Increase possibility of road accidents
- Loss of Vegetation due to clearance of construction sites

Positive Social Impacts during operational phase;

- Improved Transport and economy of the people
- Improved community life and services
- Reduced traffic congestion due to increased tarmac roads
- Increased property value along the roads proposed for construction
- Increase road accidents

Positive Environmental Impacts during operational phase

- Increased greenery due to planted trees along the proposed roads for construction

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 more of engineering practices that should be adhered to during all the project phases. The major associated impacts and their mitigation measures to be observed include;

- Delay caused by relocation of utilities:* The TANESCO, KUWASA and TTCL shall be involved from the early stages of these project so as to have an integrated planning.
- Disturbance to communities caused by disruption of community services and infrastructures, as well as closure of roads:* Early notice shall be given to the community before any service interruption.
- Erosion caused by soil clearance:* Unnecessary ground clearance and sensitive re-alignments shall be avoided.
- Erosion caused by storm water on steep slopes and sharp corners:* 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.
- Possibility of soil or water pollution due to oil and fuel spillage:* 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.
- Soil and water pollution caused by construction solid waste:* 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.

-Pollution caused by noise, dust or vibration: 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.

-Poor air quality caused by dust: 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.

-Health and safety of workers: Appropriate working gear (such as nose, ear mask and clothing) and good camp management shall be provided.

-Community health and safety: The road design shall take account of safety concerns especially at human habitation crossings e.g. installation of bus stops at settlement centres.

-Accidents and incidents to community members and construction workers: 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.

-Littering around construction sites: Adequate number of waste bins shall be provided at the construction sites.

-Soil erosion and encroachment of peoples houses: Close supervision of earthworks shall be observed in order to confine land clearance within the proposed new corridor of impact boundaries.

-Removal of trees and other vegetation along the road: 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.

-Accidents and incidents along the construction roads: Installation of proper road signs and regular inspections for their presence, also installation of speed control devices like humps, as well as 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, KUWASA and TANESCO, and the local communities at large.

Decommissioning

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

Summary and Conclusion

The proposed construction of the Kahama CBD roads and storm water drain entail 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.

ACKNOWLEDGEMENT

The Kahama Municipal Council wishes 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 wards and mitaa leaders where the proposed roads are passing, association of people with disabilities, Kahama office and community representatives for provision of relevant information and for their prompt assistance during the fieldwork. The proponent would like to thank Dar Alhandasah JV Don Consult's team of Consultants, Ms. Rosemary C. Nyirenda (Lead Environmental Expert), Ms. Magdalena L. Mlowe (Environmental Specialist), Dr. Lillian G. Mulamula (Ecologist), Dr. Edmund Temba (Legal Expert), Italius Kavishe (Social and Gender Expert) and Dorcas Ephraim (Economist) for their great contribution in this project. Last but not least we thank all who in one way or another were part of the succesful completion of this report. Thanks very much all of you, this report is for all of us. Let us own it. Last but not least we thank all who in one way or another were part of the succesful completion of this report.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	II
ACKNOWLEDGEMENT	VIII
LIST OF FIGURES	XII
LIST OF TABLES	XIII
ACRONYMS	XV
CHAPTER ONE: INTRODUCTION	1
1.1 BACKGROUND	1
1.2 POPULATION	1
1.3 KAHAMA MUNICIPAL COUNCIL STRATEGIC PLAN	1
1.4 THE PROJECTS	1
1.5 PROJECT EXPECTED OUTPUTS	2
1.6 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT	2
1.7 GENERAL OBJECTIVE OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT	2
1.8 APPROACH AND METHODOLOGY	4
1.9 REPORT STRUCTURE	9
CHAPTER TWO: PROJECT DESCRIPTION AND ACTIVITIES	10
2.1 DESCRIPTION OF THE PROPOSED PROJECTS	10
2.2 RATIONALE FOR THE PROJECT	10
2.3 PROJECT DESCRIPTION	10
2.4 PROJECT ACTIVITIES	19
2.5 CONSTRUCTION MATERIALS	26
CHAPTER THREE: POLICY, ADMINISTRATIVE AND LEGAL FRAMEWORK	28
3.1 NATIONAL POLICIES	28
3.2 LEGISLATION	31
3.3 INTERNATIONAL TREATIES AND AGREEMENTS	36
3.4 REGIONAL AGREEMENTS	37
3.5 WORLD BANK ENVIRONMENTAL AND SOCIAL FRAMEWORK	37
3.6 INSTITUTIONAL FRAMEWORK	43
CHAPTER FOUR: ENVIRONMENTAL AND SOCIAL BASELINE DATA	48
4.1 INTRODUCTION	48
4.2 GEOGRAPHICAL LOCATION	48
4.3 AGRO-ECOLOGICAL ZONES AND PEOPLE	49
4.4 SOCIOECONOMIC ACTIVITIES	50
4.5 FOOD CROPS	54
4.6 INFRASTRUCTURE	55
4.7 SOCIAL SERVICES	59
4.8 ENVIRONMENTAL BASELINE CONDITIONS	62

CHAPTER FIVE: STAKEHOLDER CONSULTATIONS AND PUBLIC INVOLVEMENT	68
5.1 INTRODUCTION	68
5.2 PUBLIC CONSULTATION PROCESS	68
5.3 STAKEHOLDERS CONSULTATION DURING IMPLEMENTATION	78
CHAPTER SIX: IMPACT ASSESSMENT AND EVALUATION	79
6.1 IMPACT ASSESSMENT	79
6.2 ENVIRONMENTAL AND SOCIAL RISK CLASSIFICATION OF THE PROJECT AS PER THE WORLD BANK ESF.....	82
6.3 SPATIAL, INSTITUTIONAL AND TEMPORAL BOUNDARIES.....	82
6.4 IMPACT IDENTIFICATION	83
6.5 IMPACT RATING	84
6.6 PRE- CONSTRUCTION PHASE	87
6.7 CONSTRUCTION PHASE IMPACTS.....	87
6.8 OPERATIONAL PHASE IMPACTS.....	91
6.9 ANALYSIS OF ALTERNATIVES.....	92
6.10 IMPACTS MITIGATION MEASURES	94
CHAPTER SEVEN: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN	100
7.1 INTRODUCTION	100
7.2 ENVIRONMENTAL AND SOCIAL COSTS	100
7.3 IMPLEMENTATION OF THE ESMP	107
7.4 ROLE AND RESPONSIBILITIES FOR ESMP IMPLEMENTATION	107
7.5 INSTITUTIONAL ARRANGEMENTS AND REPORTING PROCEDURES	111
7.6 CAPACITY BUILDING PROGRAM	111
7.7 PROPOSED TRAINING PROGRAMS.....	112
CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MONITORING PLAN	115
8.1 ENVIRONMENTAL AND SOCIAL MONITORING	115
8.2 MONITORING PARAMETERS	115
8.3 GRIEVANCES REDRESS PROCEDURES.....	120
8.4 PURPOSE.....	120
8.5 PRINCIPLES	120
8.6 CONSTRUCTION GRM	120
CHAPTER NINE: COST BENEFIT ANALYSIS	122
9.1 INTRODUCTION	122
9.2 BENEFITS RELATED TO THE PROJECT.....	122
9.3 COSTS RELATED TO THE PROJECT.....	122
CHAPTER TEN: DECOMMISSIONING	123
10.1 INTRODUCTION	123
10.2 DETAILED DECOMMISSIONING PLAN	123
10.3 DEMOLITION METHODS	123
10.4 MATERIALS HANDLING.....	123

10.4 PROPOSED SEQUENCE	124
10.5 PROTECTIVE MEASURES.....	124
10.6 POTENTIAL IMPACTS AND MITIGATION MEASURES	124
10.7 CLOSURE OF BORROW PIT, QUARRY SITES AND CAMP SITES OPERATIONS	125
CHAPTER ELEVEN: SUMMARY AND CONCLUSION	126
11.1 SUMMARY AND CONCLUSION	126
11.2 RECOMMENDATIONS.....	126
BIBLIOGRAPY.....	127
APPENDICES	129
APPENDIX I: TERMS OF REFERENCES.....	129
APPENDIX II: NEMC LETTER FOR TOR APPROVAL.....	137
APPENDIX III: LIST OF STAKEHOLDERS CONSULTED	139
APPENDIX IV: HEALTH AND SAFETY MANAGEMENT PLAN	148
APPENDIX V: HYDROLOGY STUDY REPORT	160
APPENDIX VI: GEOTECHNICAL STUDY REPORT	178
APPENDIX VII: DESIGN OF STORMWATER DRAINAGE	187

LIST OF FIGURES

Figure 1: Map of Tanzania showing Shinyanga region and its districts including Kahama Municipal Council (Source: KMC, 2017)	10
Figure 2: Map of Kahama Municipal Council showing wards (Source: KMC, 2017).....	11
Figure 3: Roads network in Kahama Municipality (Source: Kahama Socio-economic profile, 2018)	12
Figure 4: Roads at the CBD Area for tarmac road construction (Source: Kahama Socio-economic profile, 2018).....	13
Figure 5: Proposed CBD roads for construction in Kahama Municipal Council (Source: Field Visit, January 2022)	14
Figure 6: Proposed storm water drain along Malunga, Mhongolo, Majengo, Nyahanga and Nyasubi Wards wards (Source: Field Visit, January 2022).....	15
Figure 7: Proposed road designs for Kahama CBD (Source: Consultant, 2022).....	16
Figure 8: Proposed duo carriage way road designs for Kahama CBD (Source: Consultant, 2022)	16
Figure 9: Typical Cross-Section for an Earth Channel (Source: Consultant, 2022).....	17
Figure 10: Typical Cross-Section for a Concrete Lined Channel (Bed and Sides) (Source: Consultant, 2022).....	18
Figure 11: Typical Cross-Section for a Grouted stone-pitching Lined Channel (Bed and Sides) (Source: Consultant, 2022)	18
Figure 12: Gold processing plant at Buzwagi Gold mine 7km from Kahama Municipality ...	52
Figure 13: The tarmac trunk road from Isaka to Bujumbura (Rwanda) which passes outside the CBD area (Source: KMC, 2017).....	55
Figure 14: Road network in Kahama Municipality	56
Figure 15: Kahama Airport.....	57
Figure 16: Water reservoir tanks in Isagehe, Kahama	58
Figure 17: Meeting with the local leaders and representatives Nyihogo Ward for the road construction (Source: Consultant, January 2022)	69
Figure 18: Meeting with local Leaders at Malunga Ward (Source: Consultant, January 2022)	69
Figure 19: Meetings with leaders and Majengo -Mhongolo Ward (Source: Consultant, January 2022)	70
Figure 20: Meeting with the local leaders and representatives Bodaboda, Bajaji and Tax drivers (Source: Consultant, January 2022)	70

LIST OF TABLES

Table 1: Spatial Rating.....	7
Table 2: Temporal Rating	8
Table 3: Types and Characteristics of Cumulative Impacts	8
Table 4: Proposed Roads for construction at Kahama CBD.....	12
Table 5: Types and sources of project requirements during the pre-construction phase.....	19
Table 6: Types, amounts and treatment/disposal of wastes during the pre-construction phase ...	20
Table 7: Types and sources of project requirements during the construction phase	21
Table 8: Manpower needed for construction activities in Zongomela Industrial Park.....	22
Table 9: Types, amounts and treatment/disposal of wastes during the construction phase.....	24
Table 10: Types and sources of project requirements during the demobilization phase	25
Table 11: Types and sources of project requirements during the operational phase (Maintenance)	25
Table 12: Types, amounts and treatment/disposal of wastes during the operational phase	26
Table 13: Developed EIA Procedures in the Road Sector.....	34
Table 14: Application of World Bank's ESSs to the TACTIC Project	39
Table 15: World Bank EHS Guidelines applicable	42
Table 16: Population of Kahama Municipal Council by Sex, Average Household Size and Sex Ratio.....	49
Table 17: Number of large, medium and small-scale minerals by 2012	51
Table 18: Production for 2013/14-2019/20 Crop season.....	53
Table 19: Road Type and Condition in the Municipality	56
Table 20: Number of Households with Reliable and Safe Sources of Water in Kahama Municipal Council 2015- 2019.....	58
Table 21: In patient Top Ten Diseases/Diagnosis in KMC.....	60
Table 22: Centre for Special Needs.....	61
Table 23: Number of primary school and enrollment	61
Table 24: Number of Secondary Schools in the Kahama Municipal Council	62
Table 25: Sound Levels Monitoring Data at Kahama Central Business District (Roads).....	62
Table 26: Findings of Flue gases at Kahama Central Business District (Roads)	63
Table 27: Temperature and Relative Humidity Monitoring Data at Kahama Central Business District (Roads).....	65
Table 28: Average values of dust levels measured at the proposed Kahama Central Business District (Roads).....	66
Table 29: Ground vibration levels at the proposed Kahama Central Business District (Roads) ..	67
Table 30: Stakeholders comments for the proposed upgrading CBD roads and rehabilitation of the storm water drain under TACTIC in Kahama Municipality.....	72
Table 31: Spatial Rating.....	80
Table 32: Temporal Rating	81
Table 33: Types and Characteristics of Cumulative Impacts	81
Table 34: Environmental and Social Impacts Matrix for the Proposed Roads at the Kahama Central Business District	85
Table 35. Sources of the harmful effects on health and safety	92
Table 36: Environmental and Social Management Plan (ESMP) for the Proposed CBD Roads upgrade and the stormwater drain rehabilitation in Kahama Municipality	101
Table 37: Role and Responsibilities of Key Parties for EMP Implementation	108

Table 38: Training Programs for Capacity Building in Environmental Supervision and Management.....	112
Table 39: Environmental and Social Monitoring Plan for the Proposed -CBD Road network and the storm water drain in Kahama Municipal Council	116

ACRONYMS

BOQ	– Bill of Quantities
CBD	– Central Business District
EHS	– Environment Health and Safety
ESIA	– Environmental and Social Impact Assessment
ESF	– Environmental and Social Framework
EMA	– Environmental Management Act
EMO	– Environmental Management Officer
ESS	– Environmental and Social Standards
ESMP	– Environmental and Social Management Plan
ESCP	– Environmental and Social Commitment Plan
FYDP	– Five Year Development Plan
GDP	– Gross Domestic Plan
GIIP	- Good International Industry Practice
GRM	– Grievance Redress Mechanism
GRC	– Grievance Redress Committee
GN	– Government Notice
IE	– Implementing Agency
KMC	– Kahama Municipal Council
KUWASA	– Kahama Urban Water Supply and Sanitation Authority
LGA	– Local Government Authority
MEO	– Mtaa Executive Officer
NEMC	– National Environmental Management Council
PwD	– People with Disability
RPF	– Resettlement Policy Framework
SEP	– Stakeholder Engagement Plan
TACTIC	– Tanzania Cities Transforming Infrastructure and Competitiveness Project
TANESCO	– Tanzania Electric Supply Company Limited
TARURA	– Tanzania Rural and Urban Roads Agency
WB	– World Bank
WEO	– Ward Executive Office

CHAPTER ONE: INTRODUCTION

1.1 Background

Kahama Municipal Council was established on July 2012 after being officially declared as a Municipal Council on Government Notice No. 174 and published on the 17th June 2011 in the Local Government (Urban Authorities) Act, (CAP.288) by the Order Made under Section 5 (3).

1.2 Population

According to the 2012 National Population and Household Census, Kahama Municipal Council had 242,208 people which are 15.8% of the regional population (1,534,808). The female population was 117,498 (48.5%) while the male population was 124,710 (51.5%). The growth rate is 3.7% per annum and by 2019 Kahama Municipality was estimated to have a population of 312,349 (Women 151,524 (48.5%) and Men 160,825 (51.5%). The age distribution for Kahama Municipal Council shows that the young population under 15 years was 49.2 percent. For the working population of the age group between 15 to 64 years the proportion was 48.7%.

1.3 Kahama Municipal Council Strategic Plan

From the year 2016/17-2020/21 Kahama Municipal Council planned to dedicate its efforts toward realization of its vision that state KMC was to be “*With Quality Services and Conducive Investment Environment for Sustainable Development*” and its mission was “*To Provide Socio-Economic Services and Create Conducive Investment Environment in Collaboration with Stakeholders using available Resources for Sustainable Development*”.

The Kahama Strategic Plan took into account among other items aspiration of the government articulated in the Second Five Years National Development Plan (FYDPII2016/17-2020/21) whose theme was: “Nurturing Industrialization for Economic Transformation and Human Development” which intended to rally and align society’s efforts towards realization of the development aspirations. This Strategic Plan has also been carried on by the Sixth Phase Government, within the trademark Philosophy of “*Kazi iendelee*”. It contains useful information for our customers, various stakeholders and development partners.

1.4 The Projects

Kahama 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 Associations (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. Kahama Municipal Council is grouped in Tier 1 as among the 12 larger, fast-growing LGAs.

The TACTIC project will provide funding to cover for the following projects in Kahama:

- Improve infrastructures at Zongomela Industrial Park (roads, market and bus stand)
- Improvements of Roads at CBD

- Construction of New Bus Terminal and improvement of Sango Market
- Improvements of Storm Water Drainage

The scope of this report is Upgrading of 10.6 km Access Roads at CBD and Rehabilitation of 3km Stormwater Drains in Kahama Municipality.

The internal environments of the proposed project sites are located at various areas within the Municipality on different roads. All the proposed projects will be implemented on roads right of way (RoW) which are owned by Kahama Municipal Council. The proposed projects are also in accordance with Kahama Municipal Council strategic plan as well as the Government vision and other strategic documents to reduce and eventually end poverty in coming few decades.

1.5 Project Expected Outputs

Kahama Municipality 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 roads and drainage system infrastructures that will contribute to the improvement of the safety and wellbeing of the people.

1.6 Environmental and Social Impact Assessment

This preliminary environmental and social finding covers for the construction of the proposed CBD road network and the upgrading of the storm water drain. 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). 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 ESIA study was conducted from January to December, 2022.

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.

This ESIA was conducted by Dar Alhandasah JV Don Consult's team of Consultants, Ms. Rosemary C. Nyirenda (Lead Environmental Expert), Ms. Magdalena L. Mlowe (Environmental Specialist), Dr. Lillian G. Mulamula (Ecologist), Dr. Edmund Temba (Legal Expert), Italius Kavishe (Social and Gender Expert) and Dorcas Ephraim (Economist).

1.7 General Objective of The Environmental and Social Impact 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: -

- To ensure that environmental considerations are explicitly addressed and incorporated into the development of decision-making process of the project;
- To anticipate and avoid, minimize or offset the adverse significant biophysical, social and relevant effects of developmental proposal.
- To promote development that is sustainable and optimizes resources' use and management opportunities.

1.7.1 Specific objectives of the environmental and social impact assessment

- (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 Kahama 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.

1.7.2 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 as amended 2021. 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.

1.7.3 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.

1.8 Approach and Methodology

The methodology employed in conducting the preliminary environmental and social assessment is in line with the Environment Impact Assessment Regulations, 2005, GN No.349 of 2005. The study was undertaken based on developed checklist and complimented by past experience of similar environmental and social studies. Observations of the proposed project site and surrounding habitats were made and literature reviewed was done through reading of reports and documents which were provided by Kahama Municipal Council. The study adopted the following approach to get the findings:

1.8.1 Field Surveys

The field visits were essential to fully realize the scope of the project, the biophysical environment specific to the location and the socio-economic conditions in the project area. Two visits to the project area were made; the first visit was done during scoping stage and the second at the detailed interview stage. All visits were made between January and March 2022.

The ESIA team used the fieldwork to conduct interview with stakeholders and also to collect information on the state of the environment. Information collected includes land use, human demography, cultural heritage and other indicators related to environmental and socio-economic trends of Kahama Municipal Council. Other information was appraised through key informants' interviews and experts' observations.

1.8.2 Public and officials Consultations

These conducted through meetings with major stakeholders of the project. During the fieldwork, consultative meetings held with municipal, ward and mitaa in the project areas within KMC. 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.

1.8.3 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.

1.8.4 Review of Relevant Documents

Important issues for completion of ESIA study deserve special reference to the existing official information particularly in the following documents:

- Country Policies and legislation relevant to the project
- Kahama Municipal Council socio economic profile and other reports
- 2012 Census report
- Project design report
- TACTIC project documents

It was important to note that undertaking the ESIA study requires first to be acquainted with standard guidelines provided in the project documents as well as reviewing other relevant literature available such as the proposed project design and plan of operation. Hence, the first attempt in undertaking this assignment had been for the Consultant to have an in-depth review of all relevant documents. The information from these documents have not only provided an insight to the project goals, policies and setting but, also, a background on establishing a checklist of questions to guide the consultation process.

1.8.5 Stakeholder's participation

Interview and public meetings were the major method used by the Consultants simply because much of the information was obtained from individual representing organizations/companies. A series of consultation forum convened to dialogue about the proposed project in light of their expectations and worries and, most importantly, the stakeholders' suggestions on how the environmentally and socially unfavorable impacts could be addressed.

Consultations were conducted involving different individuals, institutions and other key stakeholders including the following:

- i). Kahama District Council including the District Executive Director and the entire team (legal, community development, environment, physical planning, engineering),
- ii). Kahama Urban Water Supply and Sanitation Authority (KUWASA),
- iii). TANESCO, Kahama Office,
- iv). Association of people with disabilities,
- v). Association of traders along the proposed roads,
- vi). Representatives of the Association of taxi drivers parking in various points along the proposed roads,
- vii). Office of the Mayor of Kahama Municipal Council,
- viii). Mini bus stand users,
- ix). All wards where the proposed roads are passing,
- x). All mtaa officers where the proposed roads are passing,
- xi). Communities in all areas where the proposed roads are passing

Through these consultations and assessment, an assessment was made to determine the nature and magnitude of the interests and influence of the stakeholders on the planned project. The outcomes of these consultations were enriched since these were people who were knowledgeable on the likely environmental, social and economic impacts of the proposed project. During consultations, the target was to get realistic perception and viewpoints of these

stakeholders. The stockholders' analysis enabled the team to identify the extent of the stakeholders' readiness to assist or tendency of obstructing the project's development objectives, as well as ways of addressing such obstructions. The concerns of each group have been addressed in this ESIA report.

1.8.6 Project Impact Assessment

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

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

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:
- Resource loss/ecological damage
- Negative social impacts
- Foreclosure of land and resource use options
- Environmental loss and deterioration
- Probability and acceptability of risk
- Environmental sensitivity

Ecological

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

Social

- Displacement of people
- Human health and safety
- Decline in important local resource
- Loss/gain of valued area
- Disruption of community livelihoods
- Demands on services and infrastructure
- Public concern
- Political concern

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

-Spatial Scale- The spatial dimension encompasses the geographical spread of the impacts regardless of whether they are short term or long term. **Table 1** describes the ratings used in the Simple Matrix as far as spatial scale is concerned.

Table 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 2** describes the ratings used in the Simple Matrix.

Table 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 3** show types of cumulative impacts;

Table 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.

1.9 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 improvement of road network at Kahama Central Business District and the construction of the storm water drain.

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. The construction of 3km storm water drain will reduce floods because Kahama is a low land area and hence significantly affected by floods during rain seasons.

2.3 Project Description

2.3.1 Project Location

Location

The project will be implemented in Kahama Municipality in Shinyanga Region. Shinyanga is one among the 26 regions of the Tanzania mainland. Kahama Municipal Council (KMC) is located in the North-Western plateau of Tanzania. It lies approximately 3° 15" and 4° 30" South of the Equator and Longitudes 31° 30" and 33° 00" East of the Greenwich meridian. It is found along the Isaka-Benako-Rusumo trunk road, about 986.12 Kilometers from Dar es Salaam, 267 Kilometers from Shinyanga, and 109 Km from Shinyanga Town. Kahama borders Nzega District to the East, Msalala District Council to the North. Bukombe and Mbogwe to the West and Ushetu District Council to the South (**Figures 1 and 2**).

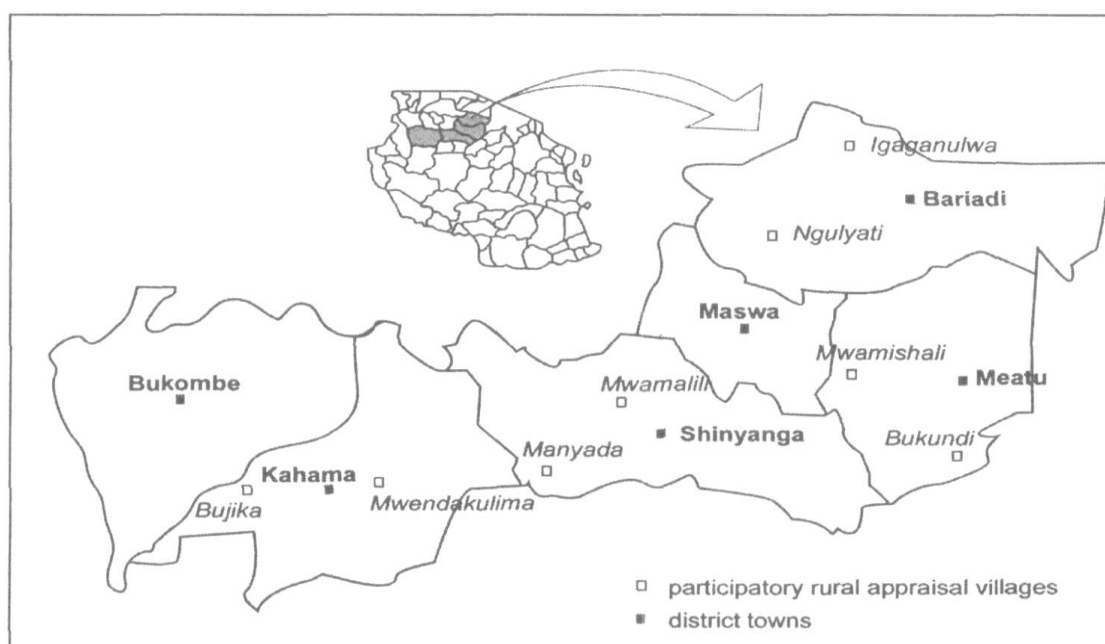


Figure 1: Map of Tanzania showing Shinyanga region and its districts including Kahama Municipal Council (Source: KMC, 2017)

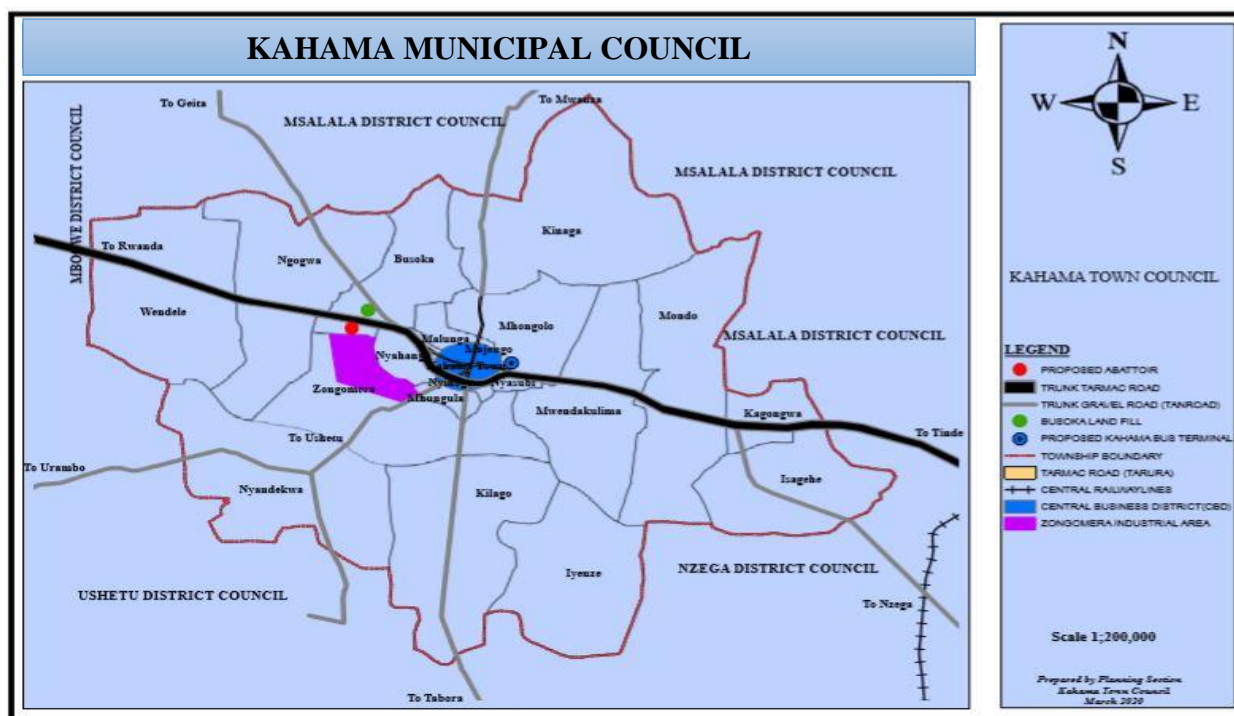


Figure 2: Map of Kahama Municipal Council showing wards (Source: KMC, 2017)

In Kahama Municipality, major roads are highly passable throughout the year but collector and feeder roads are not passable especially during rainy season. The roads are affected leading to poor accessibility to various community facilities. Kahama roads are in various conditions basing on the road inventory survey done there were tarmac roads, earth and gravel roads.

-Tarmac roads.

Kahama Municipality is served by three major tarmac roads which passes through the CBD area these are: - i). Isaka road with total length of 5.25 km, ii). Tabora road with total length of 6.42 km and iii). Lumelezi road with total length of 4.46 Km. The tarmac trunk road from Isaka to Bujumbura (Rwanda) passes outside the CBD area.

-Earth and gravel roads.

The earth and gravel roads have covered large area of CBD which connects the different activities at CBD area. These roads are of great potential because they provide a good linkage and serves large community (**Figure 3**).

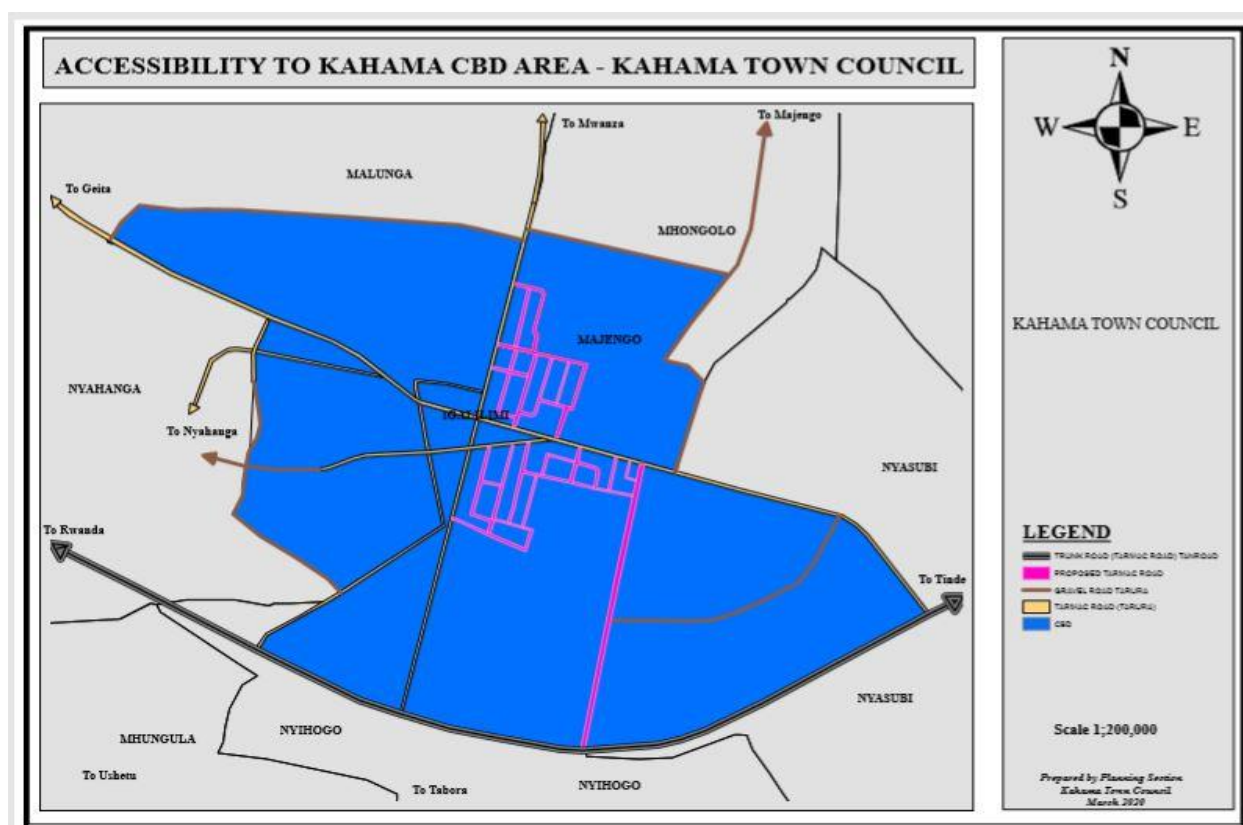


Figure 3: Roads network in Kahama Municipality (Source: Kahama Socio-economic profile, 2018)

2.3.2 Project Components

Components 1: Upgrading of the CBD Roads

Kahama roads are mostly constructed in the areas which were once used for agriculture activities especially growing of paddy. Therefore, most of the habitants and roads are either flooded or waterlogged during the rainy season. Kahama Municipal Council's aim is to link roads at CBD with existing tarmac roads. The CBD roads to be upgraded have enough corridor hence there will be no compensation but where there are public utilities such electric supply poles, water supply pipes and telecommunication lines, there will a relocation. Kahama MC will liaise with the responsible for relocation and cover all the necessary costs. The proposed CBD roads cross sensitive areas such as schools, residential areas and public utilities hence require special attention to ensure that the people and their environment are protected and proper mitigation measures are undertaken during implementation to restore them to their normal condition.

The project plans to construct 10.6 km of roads at CBD these roads are as shown per **Table 4**.

Table 4: Proposed Roads for construction at Kahama CBD

S/N	Ward	Road ID	Road Name	Distance (Meters)
1	KAHAMA MJINI	A	Mikaratusini	415
2		B	Vumilia	380
3		C	TASAF	110
4		D	Market	180
5		E	Unyamwezini	420

6		F	Namanga	370
7		G	Muslim	490
8		H	KKKT	168
9		I	Chizi	155
10		J	Shoo	135
11	MAJENGO	K	NHC	290
12		L	John Wagi	207
13		M	Mkongge	206
14		N	Machage	350
15		O	Manyovu	350
16		P	Mahongo	270
17		Q	Majani-Mapana	150
18		R	Royal	385
19	NYASUBI	Y	Mama Farida	1,330
			Isaka Road	3500
Total				6,361

The proposed roads will connect to the existing Tarmac roads which are under TARURA and thus increasing the tarmac road network at CBD as shown in **Figures 4 and 5**.

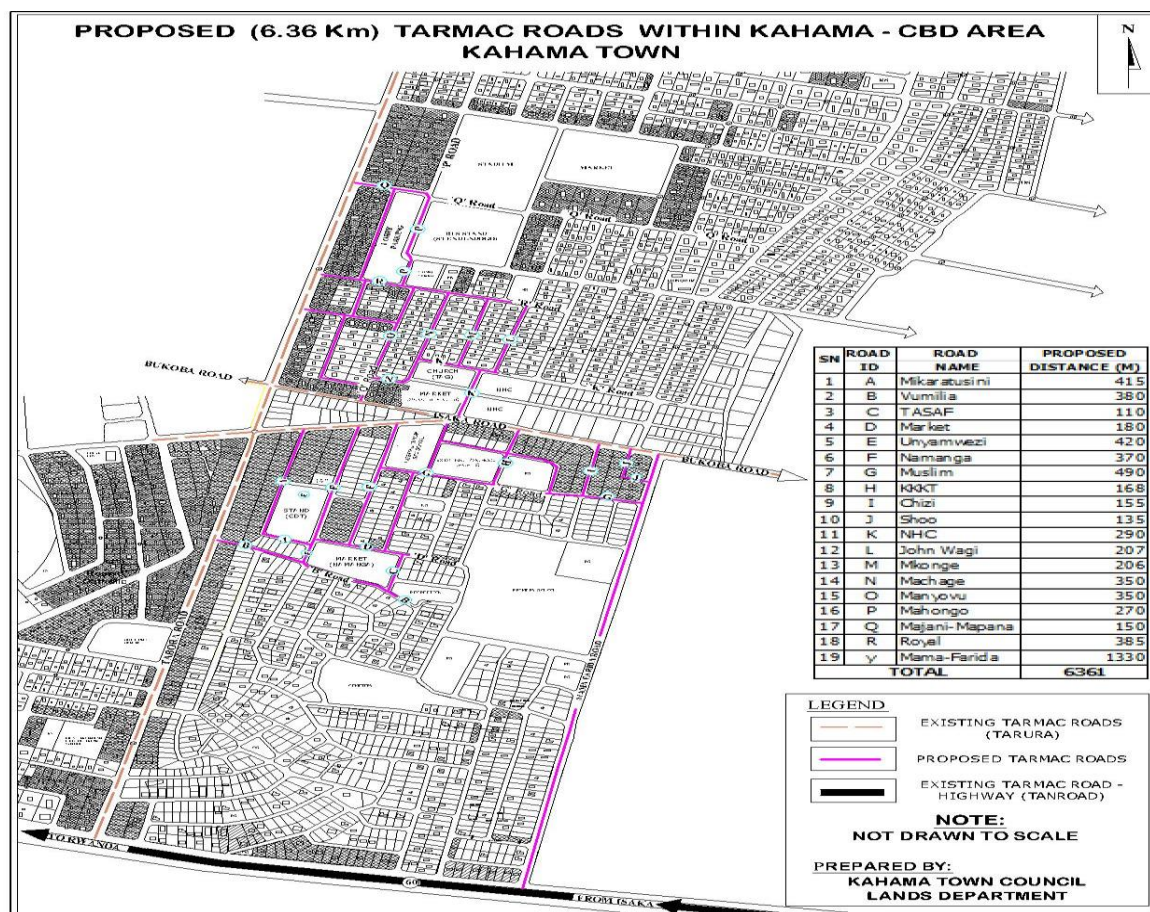


Figure 4: Roads at the CBD Area for tarmac road construction (Source: Kahama Socio-economic profile, 2018)



Figure 5: Proposed CBD roads for construction in Kahama Municipal Council (Source: Field Visit, January 2022)

Component 2: Construction of the storm water drain

Apart from the roads network the project will undertake the construction of the 3km storm water drains. These are Chelsea drainage from Chelsea Mtaa (3.809215S, 32.60285E) to Lyanzungu stream and Chunu – Magobeko drainage (starting at 3.817886S, 32.580421E) ending and ending at 3.802898S 32. 587583E). Storm water management system in Kahama Municipality is required to provide protection for the natural feature and manmade development. Currently, the storm water drainage systems consist of natural drains i.e., valley and constructed open channels along the road network. Most of the roads in Kahama Municipality have unlined drainage channels but only few parts of roads have lined drainage system. Topographical nature of Kahama Municipality is gentle sloping in several areas which facilitates flow of storm water from one place to another but also there are flat areas in few parts which cause water deposition during rainy season. The proposed drains have enough corridor hence there will be no compensation but where there are public utilities such electric supply poles, water supply pipes and telecommunication lines, there will a relocation. Kahama MC will liaise with the responsible for relocation and cover all the necessary costs. The drains cross sensitive areas such as residential areas and public utilities hence require special attention to ensure that the people and their environment are protected and proper mitigation measures are undertaken during implementation to restore them to their normal condition.

From the household survey reveal that 13% of households have drainage system within their areas while 87% of the total households have no drainage system within their areas. Therefore, due to lack of drainage system in some areas and poor drainage system in some parts in Kahama Municipality has resulted into the occurrence of flood in Nyasubi and Mhungula sub wards. Due to lack of proper sewerage systems, the storm water drains and open ditches acts as sewerages systems through which the domestic waste water is channelled. Poor storm water drainage systems along the roads. Not all roads in Kahama Municipality are provided with storm water drainage systems, which help to direct storm water to the proper channel, hence

prevent roads from deteriorating and also prevent floods from affecting other land uses, hence the need to improve roads at the Kahama Municipality (**Figure 6**).

Areas such as Chelsea Mtaa in Mhongolo Ward, Igomelo Mtaa in Malunga Ward and Sokola Mtaa in Majengo Ward are said to require immediate attention. The construction of the 3km is selected out of the total 13.5km of the storm water drain that passes through Kahama Municipality and are in need of construction. The wards which the storm water drain passes include Kahama CBD-4 Km, Majengo 3 Km, Nyahanga Km 2, Mhongolo Km 1.5, Nyasubi Km 2 and Mhungula Km 1.



Figure 6: Proposed storm water drain along Malunga, Mhongolo, Majengo, Nyahanga and Nyasubi Wards wards (Source: Field Visit, January 2022)

2.3.3 Project Design

To overcome the long-time existing problem of the poor roads and drainages in Kahama Municipality, Kahama MC is planning to upgrade 10.6km of CBD roads and 3km of stormwater drains.

The design criteria considered during the design of roads and drains are as follows:

- Studying, understanding and Local Compliance to legal and development conditions of each site;
- Site conditions including available corridor and adaptability to its condition;
- Efficiency & Sustainability;
- Long-term Operation and maintenance;
- Utilization of local materials and technology during construction;
- Local weather condition on the regions; and
- End point/ receiving body location.

Kahama CBD Roads design

Kahama MC is planning to construct 10.6 Km of roads in a tarmac standard which will include:

- Storm water drainage
- Culverts (25)
- Traffic and Street lights
- Road marking and road signs
- A road parking slots (3)
- Bus bays (10)

The proposed road designs are shown in **Figures 7 and 8**.

The project area will include the following wards: Kahama Mjini, Majengo and Nyasubi.

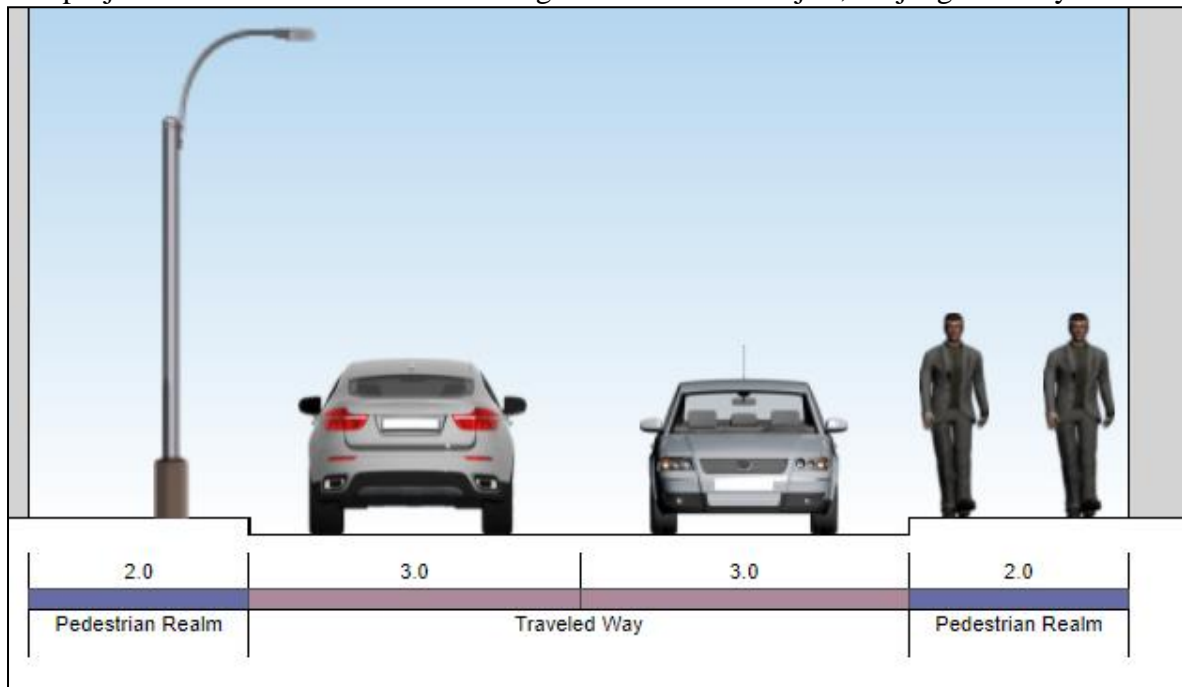


Figure 7: Proposed road designs for Kahama CBD (Source: Consultant, 2022)

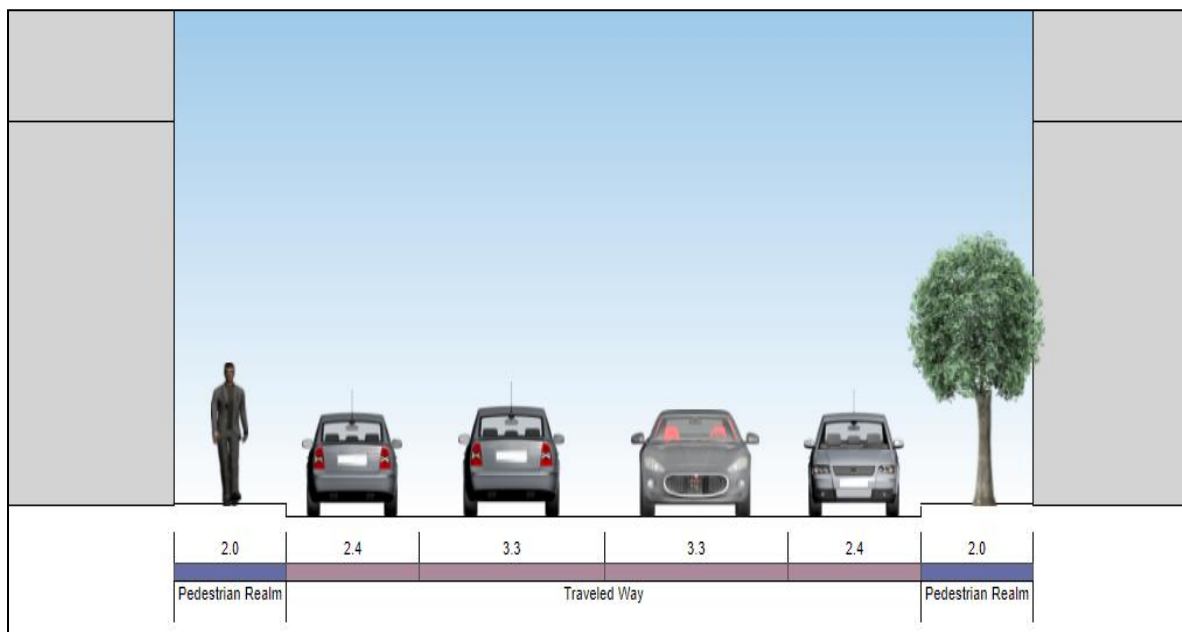


Figure 8: Proposed duo carriage way road designs for Kahama CBD (Source: Consultant, 2022)

Drainage channel designs

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

- Trapezoidal open channel
- Rectangular open channel

The choice of the type of section depends on many factors, like the available corridor width, value of land and existing land use. Trapezoidal sections are recommended in wide open spaces, while rectangular ones are recommended in high dense urbanized areas. The trapezoidal section is preferred for its economic value, slope stability and its larger conveyance capacity when compared to rectangular sections. The side slopes of channels depend on the soil conditions and practicality of construction within economical limits. Stabilization of side slopes is required in cases where poor quality soil is encountered.

The choice of the type of side-slope protection depends on many factors, like the estimated design flow at each design section, and natural slope of the terrain that affects the flow velocity in the channel or conduit. For earth channels to be river trained, a trapezoidal section is proposed with side slopes 3 horizontal to 1 vertical (**Figure 9**). For the lined trapezoidal channels, side slopes of 2 horizontal to 1 vertical are proposed.

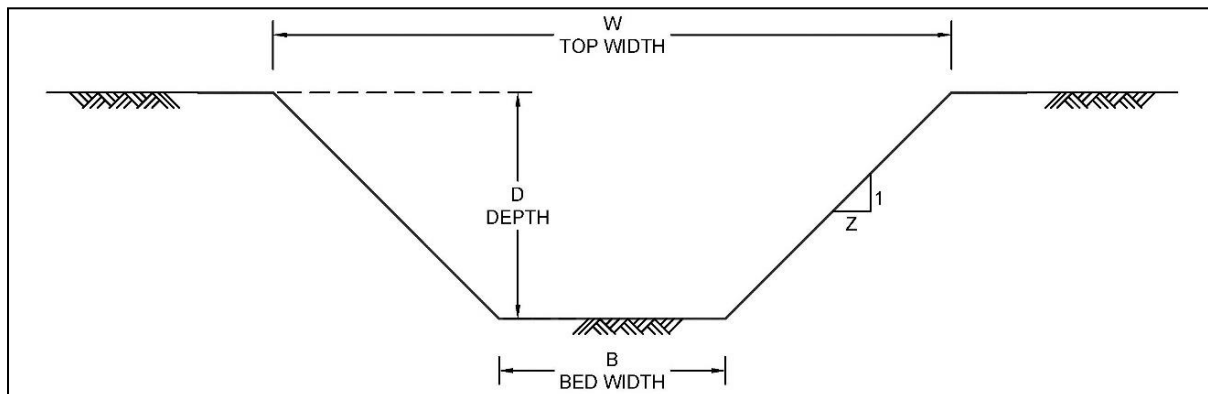


Figure 9: Typical Cross-Section for an Earth Channel (Source: Consultant, 2022)

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

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

Lining is necessary to protect drainage channels against the substantial damages due to scour (**Figures 10 and 11**).

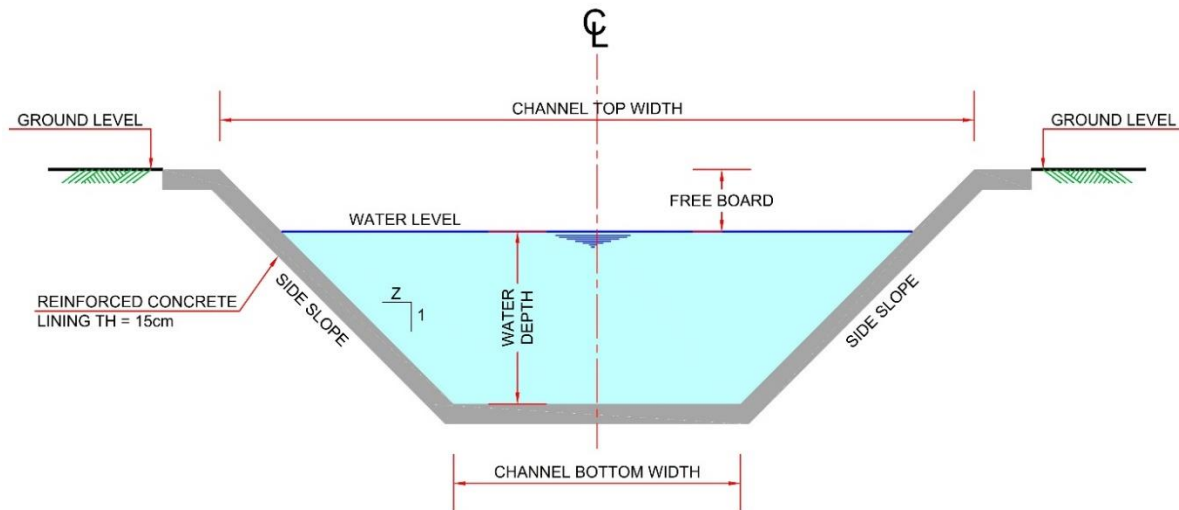


Figure 10: Typical Cross-Section for a Concrete Lined Channel (Bed and Sides) (Source: Consultant, 2022)

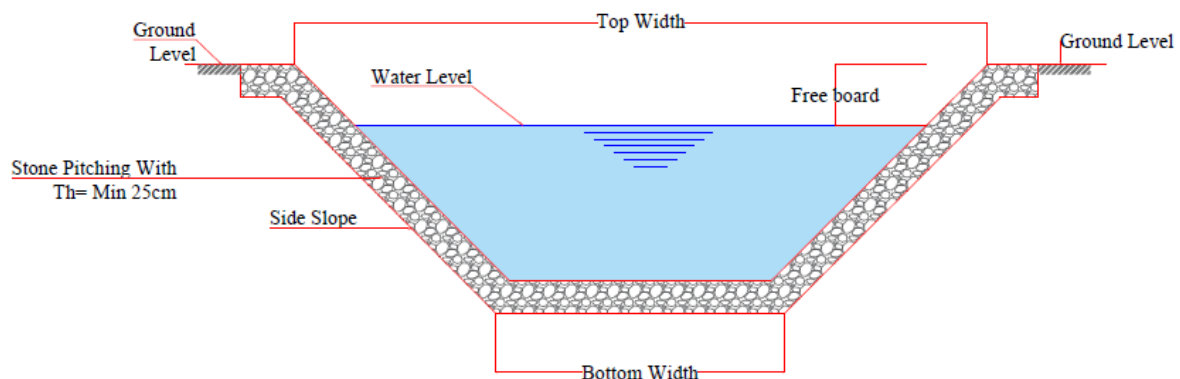


Figure 11: Typical Cross-Section for a Grouted stone-pitching Lined Channel (Bed and Sides) (Source: Consultant, 2022)

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

The project will also upgrade the storm water drain passing through Malunga, Mhongolo, Majengo, Nyahanga and Nyasubi Wards wards.

2.4 Project Activities

2.4.1 Mobilization or pre-construction phase

Activities

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

- **Topographical Survey** - Done by Surveyors to establish the boundaries and the ground levels.
- **Hydrology and Hydraulic 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 V**).
- **Geotechnical investigations** - done by the geotechnical engineers to determine the physical properties of rock and soil around the site (**Appendix VI**).
- **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. Designs provided in **Appendix VII**.
- **Environmental Impact Assessment (EIA)** - This ESIA report is 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 Six (6) months.

Types and Sources of Project requirements

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

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

Requirements	Type	Source	Quantity (Approx.)
Raw Materials	Gravel	Zongomela ward	7,800 - 10,000 tons
	Hard Stone	Zongomela ward	30 – 35 tons
	Sand	Ngongwa, Mwime, Mwendakulima, Kitwana, Busoka and Wigehe wards	55 tons
	Water	KUWASA	65,000 litres
	Cement	Local vendors, Kahama Municipality	3 tons
	Reinforcement bars	Local vendors, Kahama Municipality	9 tons
	Timbers	Local vendors, Kahama Municipality	1 ton

Requirements	Type	Source	Quantity (Approx.)
Energy	Electricity	TANESCO (National Grid)/ Generators	220 kV
	Fuel	Local vending stations	BoQ
Manpower	Skilled	Contractor	100
	Unskilled	Local People along the road	100
Equipments	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 course aggregates) from quarries will be transported by trucks to the construction site. Water will be moved by water boozers. Other materials like cement, timber and reinforcement bars will be transported by Lorries to the construction site.

Storage

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

Types, Amounts and treatment/disposal of Wastes

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

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

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
	Scrap metals and plastics	3kg per day	Sold to Recyclers
Solid Waste (Non-Degradable)	Tins and glasses	3kg per day	Taken to the Authorised dumpsite

Waste	Types	Amount	Treatment/ Disposal
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)

2.4.2 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 7**.

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

Requirements	Type	Source	Quantity (Approx.)
Raw Materials	Gravel	Zongomela ward	50,000 – 55,000 tons
	Hard Stone	Zongomela ward	130 tons
	Sand	Ngongwa, Mwime, Mwendakulima, Kitwana, Busoka and Wigehe wards	250 – 270 tons
	Water	KUWASA	500,000 litres
	Bitumen	Contractors asphalt plant	2,800 tons
	Cement	Local vendors in Kahama	10,000 tons
	Reinforcement bars	Local vendors in Kahama	80 tons

Requirements	Type	Source	Quantity (Approx.)
	Timber	Local vendors	1 ton
Energy	Electricity	TANESCO (National Grid)/ Generators	220kV
	Fuel	Local vending stations	BoQ
Manpower	Skilled	-Contractor	25
	Unskilled	-Local People	75
Equipment	Dozer	-Contractor	2
	Grader	-Contractor	3
	Pay Loader	-Contractor	3
	Excavator	-Contractor	4
	Vibro Roller	-Contractor	4
	Tandem Roller	-Contractor	1
	Macadam Roller	-Contractor	1
	Tire Roller	-Contractor	2
	Dump Truck	-Contractor	8
	Mixer Truck	-Contractor	2
	Water Truck	-Contractor	3
	Tractor w/Trailer	-Contractor	4
	Tire crane	-Contractor	2
	Cargo Crane Truck	-Contractor	1
	Cargo Truck	-Contractor	2
	Crusher Plant	-Contractor	1
	Screen Unit	-Contractor	1
	Concrete Batch Plant	-Contractor	1
	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)

Labour to be used during construction

During construction, there will be manpower need which will comprise of skilled and unskilled labour as described in **Table 8**.

Table 8: Manpower needed for construction activities in Zongomela Industrial Park

Manpower	Skilled	25	Contractor	Social unrest and conflicts
	Unskilled	75	Local People	

(Source: consultant's analysis, 2022)

Table 8 is also in tandem with the Environmental and Social Standard (ESS) 2 on Labour and working conditions. 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 guidance¹ 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 course aggregates) from quarries will be transported by trucks to the construction site. Water will be moved by water boozers. Other materials like cement, timber and reinforcement bars will be transported by Lorries to the construction site.

Storage

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

Types, Amounts and treatment/disposal of Wastes

Types, amounts and treatment/disposal of wastes during the construction phase are shown in **Table 9**.

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.

Table 9: 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 both sides of the roads	Backfilling material in the borrow pits, fill the diversions.
	Scrap metals, drums and plastics	8 kg per day	Sold to Recyclers
	Tins and glasses	8 kg per day	Taken to the Authorised dumpsite at
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)

2.4.3 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 10**.

Table 10: 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.

2.4.4 Operation phase

Activities

The actual usage of the road is expected to commence after the construction works. The project roads are under “road” category and therefore will be directly managed by Kahama MC. The design period is 20 years, after which re-surfacing will be needed. During this time, will carry out routine maintenance by attending to pot holes, clearance of vegetation within the CoI (Corridor of Impact) and monitoring. Other activities includes Installation of road signs, thermo-plastic road marking, reinforcement and replacement of road furniture, control of litter accumulation on road sides, awareness rising on proper road use and road management to the communities, monitoring and evaluation, management to reduce pollutant concentrations in runoff, disposal of wastes from road maintenance activities, storage and management of maintenance materials and equipment.

Duration

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

Types and Sources of Project requirements

Types and sources of project requirements during the operational phase are shown in **Table 11**.

Table 11: Types and sources of project requirements during the operational phase (Maintenance)

Requirements	Type	Source	Quantity (Appprox.)
Raw Materials	Gravel	Zongomela ward	5,000 tons
	Hard Stone	Zongomela ward	15 tons
	Sand	Ngongwa, Mwime, Mwendakulima, Kitwana, Busoka and Wigehe wards	300 tons

	Water	KUWASA	100,000 litres
	Asphalt	Contractors asphalt plant	4,500 tons
	Cement	Local vendors in Kahama	5 tones
Manpower	Skilled	Contractor	10
	Unskilled	Local People along the road	20
Equipments	Excavator	Contractor	1
	Wheel loader	Contractor	1
	Water Booser	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)

Transportation

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

Storage

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

Types, Amounts and treatment/disposal of Wastes

Types, amounts and treatment/disposal of wastes during the construction phase are shown in **Table 12**.

Table 12: Types, amounts and treatment/disposal of wastes 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	5kg per Month	Sold to Recyclers
	Asphalt concrete, Tins, glasses	5 kg per Month	Taken to the dumpsite
Liquid waste	Oils and greases	Non	Car maintenance will be done at proper garages

(Source: consultant's analysis, 2022)

2.5 Construction Materials

The main construction materials for the road include sand, gravel, hard stones (aggregates), reinforcement iron bars, water and bitumen. Most of the materials shall be obtained locally

(within Tanzania) except bitumen which shall be imported. Material investigations have been made with the aim of identifying sources for suitable construction materials including borrow pits, sand pits, construction water sources and quarry sites. All materials taken be sourced from existing sources by using certified suppliers (Probably new quarry site or borrow pit shall be opened for this project). The permits for sources of these materials shall be obtained during the project implementation.

2.5.1 Borrow Areas

-Gravel Source: The following Borrow pits are available and can be easily accessed for the project, although some of them have been exhausted but still to be extended.

-Hard Stones: To be sourced from a crusher located in Zongomela ward (6.5 km from the CBD)

-Quarry sites: To be sourced from a crusher located in Zongomela ward (6.5 km from the CBD)

-Sand for Concrete: To be sources from borrow pits located in various wards namely Ngongwa ward (20km from Kahama Municipality), Mwime ward (18 km), Mwendakulima (14km), Kitwana (14km), Busoka (17km) and Wigehe (17km)

-Water Sources

Water will be supplied by Kahama Urban Water Supply and Sanitation Authority (KUWASA).

2.5.2 Sources of industrial materials for road construction

Traditional road construction materials that will be used in this project, generally have been tested by approved laboratories for compliance. These include;

-Cement, Iron Bars and Timber

Supplied by local vendors in Kahama Municipal Council. The Cement is easily available in Kahama, packed in 50kg bags and sourced from Kahama Municipality.

-Reinforcement Steel

Reinforcing steel for structural works is also be supplied by local vendors in Kahama Municipal Council. 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 available from the contractors asphalt plant to be established close to the project area. Bitumen properties will be checked by testing representative samples in approved laboratories.

-Lime

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

CHAPTER THREE: POLICY, ADMINISTRATIVE AND LEGAL FRAMEWORK

3.1 National Policies

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

3.1.1 National Environmental Policy (NEP) of 2021

Tanzania currently aims to achieve sustainable development through the rational and sustainable use of natural resources and to incorporate measures that safeguard the environment in any development activities. The environmental policy document seeks to provide the framework for making the fundamental changes that are needed to bring consideration of the environment into the mainstream of the decision-making processes in the country. The National Environmental Policy, 2021 serves as a national framework for planning and sustainable management of the environment in a coordinated, holistic and adaptive approach taking into consideration the prevailing and emerging environmental challenges as well as national and international development issues. It is worth noting that, effective implementation of this policy requires mainstreaming of environmental issues at all levels, strengthening institutional governance and public participation in environmental management regime. The long-term vision of this policy is geared towards realization of environmental integrity, assurance of food security, poverty alleviation and increased contribution of the environmental resources to the national economy.

The National Environmental Policy of 2021 replaces the NEP of 1997 whose objective was to provide for the implementation of a range of strategic interventions to address the identified priority areas of environmental concerns by involving Government sectors and other stakeholders. This approach was preferred on the understanding that all stakeholders would take priority actions to address the environmental challenges based on the fact that environment is a cross-cutting issue and as such environmental challenges affect all sectors. In order to implement the Policy, the Government enacted the Environmental Management Act (2004) to provide for legal and institutional framework for sustainable management of the environment. In addition to this, the Government in collaboration with other stakeholders implemented several strategies, 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 it gives policy directions towards enhancing environmental protection through environmentally friendly and sustainable transport infrastructure both in the rural and urban areas. This project is the Implementation of this policy since the Project roads shall provide a reliable means of transporting people for good social welfare.

3.1.3 National Gender Policy of 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 Kahama 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 National Water Policy, 2002

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

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

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

3.1.6 The 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.

3.1.7 The National Land Policy, 1997

The policy recognizes the need for protecting the environmental. It stresses protecting the environment and natural ecosystem from pollution; degradation and physical destruction. Important sections of the policy relevant to the proposed project are section 2.4 (on use of land to promote socio-economic development; section 2.8 (on the protection of land resources), section 3 (iii) and section 4 (on land tenure). This sub-section is relevant and guides the proponent in terms of occupancy, land use and land-use change at the project site.

The proposed project implementation shall use existing land which planned for education use and generated waste (solid and liquid) will be managed where septic tank will be used for management of domestic wastewater and wastewater treatment plant will be constructed for treating effluent from workshop training.

3.2 Legislation

3.2.1 Environmental Management Act No. 20 of (2004), Cap. 191 as amended 2021

The Environmental Management Act (EMA) is a piece of legislation that forms an umbrella law on environmental management in Tanzania. Its enactment has repealed the National Environment Management Council Act. 19 of (1983) while providing for the continued existence of the National Environment Management Council (NEMC). Among the major purposes of the EMA are to provide the legal and institutional framework for sustainable management of the environment in Tanzania; to outline principles for management, impact and risk assessment, the prevention and control of pollution, waste management, environmental quality standards, public participation, compliance and enforcement; to provide the basis for implementation of international instruments on the environment; to provide for implementation of the National Environmental Policy; to provide for establishment of the National Environmental Fund and to provide for other related matters.

Part VI of the EMA deals with Environmental Impact Assessments (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’*. Kahama 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 employees. Employers must also ensure that the equipment used by employees is safe and shall also provide proper working gear as appropriate. PMO-RALG and Contractor shall observe this law during construction.

3.2.4 Employment and Labour Relations Act of 2004 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. PMO-RALG shall see to it that the Contractor adheres to employment standards as provided for by the law.

3.2.5 Engineers Registration Act and its Amendments 1997 and 2007

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

3.2.6 Contractors Registration Act (1997)

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

3.2.7 HIV and AIDS (Prevention and Control) Act of 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, 2015

An Act to provide for compensation to employees for disablement or death caused by or resulting from injuries or diseases sustained or contracted in the course of employment; to establish the Fund for administration and regulation of workers compensation and to provide for related matter. The Act applies to all employers and employees, including those in the

public service, as well as those employed on a Tanzania ship or aircraft. The Act applies to mainland Tanzania.

3.2.9 The Water Resources Management Act, 2009

This legislation repeals the Water Utilization (Control and Regulation) Act (1974). The Act provides for institutional and legal framework for sustainable management and development of water resources; outlines principles for water resources management; for prevention and control of water pollution; and provides for participation of stakeholders and general public in implementation of the National Water Policy. Its main objective is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways that among others meets the basic human needs of present and future generations, prevents and controls pollution of water resources and protects biological diversity especially the aquatic ecosystems.

In accordance with this law, all water resources in Mainland Tanzania shall continue to be public water and vested in the President as the trustee for and on behalf of the citizens. The power to confer a right to the use of water from any water resource is vested in the Minister responsible for water. There are streams across the project roads as well as the drains. The authority responsible will be consulted prior implementation and abstraction of water from the schemes in the project areas.

3.2.10 The Energy and Water Utilities Regulatory Authority Act, [Cap.414 R.E 2019]

The Energy and Water Utilities Regulatory Authority (EWURA) is an autonomous multi sectoral regulatory authority established by the Energy and Water Utilities Regulatory Authority Act, 2001 Cap 414 of the laws of Tanzania. The functions of EWURA include among others, licensing, tariff review, monitoring performance and standards with regards to quality, safety, health and environment. EWURA is also responsible for promoting effective competition and economic efficiency, protecting the interests of consumers and promoting the availability of regulated services to all consumers including low income, rural and disadvantaged consumers in the regulated sectors. The proponent shall abide by this Act by ensuring all its activities are regulated hence resulting to quality services such as roads and drains.

3.2.11 Environmental Impact Assessment and Auditing Regulations, 2005 as amended 2018

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.

3.2.12 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, Local Government Authorities (District Councils) under the Prime Minister's Office Regional Administration, and Local Government (PMO-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.

3.2.13 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 13**.

Table 13: Developed EIA Procedures in the Road Sector

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 (IEE) 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.

3.2.14 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
- 1712 Clean up and Disposal of waste materials
- 1713 Measurements and Payments

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

3.2.15 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 licenses; (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 license 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.

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

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

3.2.17 Environmental Management (Soil Quality Management) Regulations, 2007

The object of these Regulations is to:

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

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

3.3 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 14**.

Table 14: 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	<p>A number of project workers will be employed for the implementation of the project including construction of different investment subprojects. Project workers will be provided with information and documentation that is clear and understandable regarding their terms and conditions of employment. The information and documentation will set out their rights under national labor and employment law (which will include any applicable collective agreements), including their rights related to hours of work, wages, overtime, compensation and benefits, as well as those arising from the requirements of this ESS. This information and documentation will be provided at the beginning of the working relationship and when any material changes to the terms or conditions of employment occur.</p> <p>In order, to ensure fair treatment of workers, the Project will ensure that terms and conditions of employment (hours, rest periods, annual leave, non-discrimination and equal opportunity in recruitment and employment), respect for workers organizations, inclusion of redundancy plans, the prohibition of forced 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 guidance²¹ regarding the COVID-19 situation in relation to stakeholder consultations, project worksites and related areas.</p>
ESS 3: Resource Efficiency and Pollution	Yes	Implementation of most of the investment subprojects will involve construction activities that will generate dust, erosion, sediments, solid and liquid wastes that will be properly managed via ESIAs, ESMPs and WMP. More or less similar

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
Prevention and Management		impacts are likely to be experienced during operation phases and will be managed by the same tools as well as operation and maintenance plans.
ESS 4: Community Health and Safety	Yes	<p>Construction activities (excavation, vehicle operations, work at height, use of chemicals, use of crane or other heavy equipment etc.) may have irreversible effects of disability or fatality to community. Localized negative impacts (like dust emissions, accidents, etc.) to sensitive receptors such as schools, religious buildings and community centers will need to be managed. The Project will require Contractors to prepare appropriate plans for emergency preparedness and response, management and safety of hazardous materials, traffic and road safety, security personnel, etc. as per the requirement of ESS4.</p> <p>Implementation of the Project is likely to trigger influx of workers or job seekers and their followers into 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.</p> <p>As the situation permits and depending on the public health circumstances, the project will ensure compliance with national law, policies and protocol requirements as well as World Health Organization and World Bank guidance³ regarding the COVID-19 situation in relation to stakeholder consultations, project worksites, communities and related areas.</p>
ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Yes	<p>Land acquisition, restrictions on land use and involuntary resettlement are likely during the implementation of the Project. The RPF will provide guidance on RAP preparation.</p> <p>The project shall try to minimize land acquisition and any associated physical or economic resettlement wherever possible especially during detailed engineering designs for roads, drains, and other community facilities to be upgraded/constructed.</p>
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Yes	<p>No sub-projects will be financed inside or near protected areas and sensitive habitats. Sub-projects will be screened for potential direct and indirect impacts on natural habitats.</p> <p>In case the project will purchase natural resources commodities such as timber, it will be important to establish the source area and to have a mechanism in place to ensure that the Primary Suppliers are not significantly impacting sensitive ecosystem or degrading natural habitats.</p>
ESS 7: Indigenous People/Sub-Saharan African	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.

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
Historically Underserved Traditional Local Communities		
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 Kahama 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.

3.5.3 World Bank EHS Guidelines

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

applicability of the EHS Guidelines will be tailored to the hazards and risks established for the project in accordance to the proposed project activities. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of technical feasibility. The applicability of specific technical recommendations will be based on the professional opinion of qualified and experienced persons.

The project proponent shall comply with the relevant requirement of environment, health and safety (EHS) of the World Bank Group (WBG). The World Bank Environmental Health and Safety General Guidelines containing quantitative limits and good international management practices to manage potential impacts (**Table 15**).

Table 15: World Bank EHS Guidelines applicable

EHS Guideline	Content & Relevance to CBD Roads and the storm water drain
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 at the CBD and the storm water drain. 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 Borrowers⁴;

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 website⁵.

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 (EMP);
- 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 (EMP) during and after construction of the road; Monitors the effects of activities on the environment during and after construction;

3.6.6 Sector Ministries

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

The Sector Ministries' Environmental Sections;

- Ensure environmental compliance by the Sector Ministry;
- Ensure all environmental matters falling under the sector ministry are implemented and report of their implementation is submitted to the DoE;
- Liaise with the DoE and the NEMC on matters involving the environment and all matters with respect to which cooperation or shared responsibility is desirable or required;
- Ensure that environmental concerns are integrated into the ministry or departmental development planning and project implementation in a way which protects the environment;
- Evaluate existing and proposed policies and legislation and recommend measures to ensure that those policies and legislation take adequate account of effect on the environment;
- Prepare and coordinate the implementation of environmental action plans at national and local levels;
- Promote public awareness of environmental issues through educational programmes and dissemination of information;
- Refer to the NEMC any matter related to the environment;
- Undertake analysis of the environmental impact of sectoral legislation, regulation, policies, plans, strategies and programmes through strategic environmental assessment (SEA);
- Ensure that sectoral standards are environmentally sound;
- Oversee the preparation of and implementation of all 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 Kahama Municipal Council, all Environmental issues handled by the District 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, Municipal Councils, Township, Kitongoji, Ward, Mtaa and Village.

The Environmental Management Committee of each jurisdiction:

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

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

- Ensure enforcement of the Environmental Management Act in their respective areas;
- Advise the Environmental Management Committee on all environmental matters;
- Promote awareness in their areas on the protection of the environment and conservation of natural resources;
- Collect and manage information on the environment and the utilization of natural resources;
- Prepare periodic reports on the state of the local environment;
- Monitor the preparation, review and approval of 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.

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

CHAPTER FOUR: ENVIRONMENTAL AND SOCIAL BASELINE DATA

4.1 Introduction

Sets out in detail the baseline data that is relevant to decisions about project location, design, operation, or mitigation measures. This should include a discussion of the accuracy, reliability, and sources of the data as well as information about dates surrounding project identification, planning, and implementation. Identifies and estimates the extent and quality of available data, key data gaps, and uncertainties associated with predictions. Based on current information, assesses the scope of the area to be studied and describes relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences. Takes into account current and proposed development activities within the project area but not directly connected to the project.

4.2 Geographical Location

4.2.1 Coordinates and boundary

Kahama Municipal Council was officially published on 15th October, 2010 through Government Notice No 393; and begun to execute its functions on 17th June 2011 as per certificate but full operationalization began in July, 2012. Kahama Municipal Council which is northern western plateau of Tanzania is in Kahama District which is one of the three (3) Districts in Shinyanga Region namely Kishapu, Shinyanga and Kahama.

Kahama Municipal Council is located between latitude 30 15" and 40 30" South of the Equator and Longitudes 310 30" and 330 00" East of Greenwich on the road off to neighboring countries of DRC Congo, Uganda, Burundi and Rwanda. It borders Tabora Region to its eastern part by linking to Nzega District and Msalala District Council and Geita region to its north.

4.2.2 Area and Administrative Units

The size of Kahama Municipal Council covers an area of 1520.2Km² (152,016.1 ha) of which 45,834.5 hectare is used for residential and 106,181.6 ha used for diverse economic activities including farming and livestock keeping and is administratively divided into 20 wards comprising of most of Kahama Division. However, other parts of the council cover rural area with 45 villages.

The Municipalship area has 20 wards namely Kahama Mjini, Nyasubi, Majengo, Nyahanga, Zongomela, Mhongolo, Nyandekwa, Iyenze, Kinaga, Busoka, Ngogwa, Wendele, Kagongwa, Isagehe, Mondo, Mwendakulima, Kilago, Nyigogo, Mhungula and Malunga. Also has 45 Villages which are subdivided into 32 sub-villages (Mitaa) and each ward being a group of streets that are locally administered as a unit. Each ward has an Executive Officer and every village has its own village government and assembly.

Politically the Municipal council is within 1 electro constituencies with 20 Wards each represented by one elected Councilor and six appointed Councilors representing special seats for women. This makes a total of 28 Councilors including 2 members of parliament. There are also politically elected leaders, 45 at the villages and 32 at sub- village levels (mitaa).

4.3 Agro-Ecological Zones and People

4.3.1 Climate

Kahama Municipal Council is dominated by extensive plains, gently undulating plain and flat plains which covers almost 82% of the surface. 13 % of the surface is valleys (Mbuga) and Hills occupy 5% of the total surface. It receives rains in the duration of approximately 5 months, starting from late October to early May. This rainy season is characterized by two-week to one-month dry spells, being most pronounced in January and February. It receives an average rainfall between 750 to 1030 mm. Temperatures is relatively constant throughout the year, with mean daily temperature ranging from 210 C to 260C. The proposed roads and stormwater drain designs shall take into consideration changes of weather particularly in terms of temperature and rainfall by ensuring the roads have drains which have the capacity to collect all the water from rains and convey it to the designated end point/ receiving water body. Tree planting on the roads and drain sides is encouraged so as to minimize extreme hot condition and prevent dust during hot and windy seasons respectively as well as conserving environment.

4.3.2 Population Size and Growth

According to the 2012 National Population and Household Census, Kahama Municipal Council had 242,208 people which are 15.8% of the regional population (1,534,808). The female population was 117,498 (48.5%) while the male population was 124,710 (51.5%). The growth rate is 3.7% per annum and by 2020 Kahama Municipal was estimated to have a population of **313,902** (Women 161,624 (51.4%) and 152,277 (48.5%) with 49,436 numbers of households at the average family size of 5 persons and the life expectancy set at an average of 45 years. The high growth rate is attributed to immigration rather than to human multiplication. Presence of Buzwagi Gold Mine and the Municipal being a business centre contribute to the increasing population (**Table 16**). The proposed project is likely to lead to increased population in Kahama since people will be coming from different areas in search for employment opportunities during project implementation and urbanization.

Table 16: Population of Kahama Municipal Council by Sex, Average Household Size and Sex Ratio

No.	Ward	Type	Population size (Number)			Household	area (Hector)	Projected Population (2020)
			Population (2012)	Women	Men			
1	Majengo	Urban	15,917	8,334	7,583	3,861	9,008	20,628
2	Nyasubi	Urban	20,181	10,469	9,712	4,502	16,601.8	26,154
3	Nyihogo	Urban	13,622	7,047	6,575	3,515	24,203.6	17,654
4	Nyahanga	Urban	15,794	8,282	7,512	3,585	1,082	20,469
5	Kahama Mjini	Urban	6,621	3,142	3,479	1,348	17928.8	8,580
6	Malunga	Urban	10,225	5,371	4,854	2,360	797.0	13,251
7	Mwendakulima	Urban	13,711	7,014	6,697	2,611	2,294	17,769
8	Busoka	Urban	5,323	2,705	2,618	1,002	7,001.9	6,898
9	Mhungula	Urban	10,486	5,431	5,055	2,396	11,905.9	13,589
10	Zongomera	Urban	10,438	5,177	5,261	1,869	1,267.4	13,527
11	Mhongolo	Urban	15,427	7,954	7,473	3,299	1,606.3	19,993
12	Nyandekwa	Rurali	11,391	5,782	5,609	2,098	15,134	14,762
13	Ngogwa	Rural	8,202	4,131	4,071	1,397	632.2	10,629
14	Wendele	Rural	7,536	3,790	3,746	1,296	4,801.6	9,766
15	Kinaga	Rural	14,841	7,665	7,176	2,453	1,906	19,233

16	Isagehe	Rural	10,828	5,606	5,222	1,923	1075.5	14,033
17	Mondo	Rural	11,481	5,918	5,563	1,859	7,873.0	14,879
18	Kagongwa	Rural	21,446	11,193	10,253	4,814	6,718.1	27,794
19	Kilago	Rural	11,118	5,728	5,390	2,072	5,017	14,408
20	Iyenze	Rural	7,620	3,971	3,649	1,177	15,162	9,875
	TOTAL		242,208	124,710	117,498	49,437	152,016	313,891

Source: Tanzania National Census-2012

4.4 Socioeconomic Activities

4.4.1 Gross Domestic Product (GDP)

Levels of GDP per capita are obtained by dividing GDP at current market prices by the population. A variation of the indicator could be the growth in real GDP per capita, which is the percentage change in real GDP divided by the population. In the year 2014/2015 records indicated that Revenue collection and utilization for Kahama Municipal Council increased from 86% to 94.34 % in the year 2017/2018. Kahama Municipal Council GDP and Per Capital Income with land labour and its skills, and capital including equipment, provide the main means of economic production. Natural resources and advantages of its location form the major base of the economy of Kahama Municipal Council.

Kahama Municipal Council, like other councils in central, northern and lake zones, has larger livestock population, including cattle, goats, sheep and poultry and consider the second economic activity that can employ significant number of people and contributes large share to the GDP of Shinyanga region and country at large. Unfortunately, its contribution to the regional GDP is very low. Main reason for poor performance of these sectors has been influenced by poor or traditional practice of Agriculture, livestock keeping with no regular treatment, absence of livestock infrastructure and medicine. The proposed project is likely to increase the municipality's contribution to regional GDP as a result of increased economic activities that will be facilitated by improved transportation as a result of improved roads.

4.4.2 Agriculture

Agriculture is the main source of income to the majority of households residing in Kahama Municipal Council. Most of them are engaged in rice and maize cultivation and some vegetables and fruits cultivation. Others obtain their sources of cash income from different petty businesses and some are employed in different private and public institutions. However, agricultural activities have been the key contributor to the council's per capita GDP compared to other activities in the council. Agriculture and forestry are the main sources of livelihood of the people of Kahama Municipality.

Kahama MC comprises a total area of 152,016.1 Ha (1,520.2km²) of which available arable land for cultivation is 71,873 Ha (47.3%) of the total land. While, suitable land for irrigation is about 4000 Ha and area under irrigation is 3.2 Ha. (0.08 %) of total suitable land for irrigation). The population is 242,038 (Census 2012) and an estimate of 323,905 (Women 157,130 (48%) and Men 166,775 (51%) by 2019 while the total number of farmers is 10630 (4.4% of total population). KMC agriculture sector contributes about 35% employment to Kahama residents and 45% revenues. The proposed project will bring positive impacts to the agricultural sector in Kahama due to improved roads that will lead to easy transportation of agricultural products to other areas.

4.4.3 Beekeeping

Though beekeeping practice is still done in traditional ways but it is another subsector which earns income to Kahama Municipality. Beekeeping in Kahama Municipality produces poor quality of bee products such as honey, glue and Bee wax due to its local mode of its production. Currently, the council has 7 beekeeper groups, 216 modern beehives as well as 220 local beehives and 1 honey processing industry.

Currently, production and productivity in Kahama Municipality honey production by June 2019 is estimated to 2670 Kg per year that fetch Tshs. 10,680,000/- and 186 Kg of beeswax fetch Tshs.612,000/-. Also, there is an increase of beekeepers within the council compared to past trend where 60 in 2015, 65 in 2016, 80 in 2017, in 2018 and 92 in 2019. In Kahama Municipal council there are only two apiaries, one is in Wendele (Ngogwa) with 110 hives and another one is in Mwendakulima (Mwendakulima) with 150 beehives. The current status of Beekeeping Reserves is as follows: (Kilago village Forest (Ngitile) with a total area of 304.32 Ha, Ngulu Vilaage (Ngitili) at Ngongwa with ana area of 330.14 Ha., Iganhwa Village Forest (Ngitili) with an area of 141 ha., Ukamba Local Authority Reserve at Bukamba. This has 1,000 Ha, Mkweni Hills Reserve at Wendele. This is under TFS and has an area of 15,744 ha, Chapulwa Forest reserve at Mwendakulima. The proposed project will bring positive impacts to the agricultural sector in Kahama due to improved roads that will lead to easy transportation of bee products such as honey.

4.4.4 Mining Sector

Kahama Municipal Council plays a significant role in mineral production in the country. However, the sector has yet to contribute significantly to the council's and community economy. Kahama Municipal Council attracted a large flow of Foreign Direct Investment, mainly in the mining of gold at Buzwagi in Mwendakulima Ward (**Table 17**). Minerals are a principal source of income for many developing countries, including Tanzania. At first glance, mineral-rich economies have an advantage over those less well-endowed because minerals provide funds for rapid development and poverty reduction. Mining in Kahama Municipal Council is a famous economic activity and therefore mining sector has significant contribution to the council's economy. The mineral deposit available in the council is Gold which is in large scale at Buzwagi Gold Mine (Open ground mining), Also there is small scale gold mining activities at Mwime However, Small-scale Diamond mines are found at Nyang'hwale where large mining companies were operating in the past (**Figure 9**). Roads are one of important infrastructures that will lead to improved transportation which will enhance productivity in the mining sector.

Table 17: Number of large, medium and small-scale minerals by 2012

District	Type of Mineral Deposits	Small Scale	Medium Scale	Large Scale
Kahama	Gold	6	0	1
Total		6	0	1



Figure 12: Gold processing plant at Buzwagi Gold mine 7km from Kahama Municipality

4.4.5 Nature and Tourism

According to the national industry's mission statement that forms the basis of the tourism policy is develop sustainable quality tourism that is ecologically friendly to the conservation and restoration of the environment and its people's culture. Kahama Municipal Council is one of the unique destinations in the Tanzania that has yet been discovered by many. It is a land of much wonder holding an unparalleled diversity of fauna, flora and many natural features.

Tourism is of growing importance as visitors stop during their journey to use the facilities and services available in the Municipal. The existence of large number of quality and well-equipped Hotels in the Municipal also offers scenic sites for camping and rest that are attracting a growing number of tourists who come from various parts of the world to Gombe and Malagarasi western Tanzania. Such visitors include those attending conferences and workshops, and foreigners on safari and beach holidays travelling from the north to south of Africa in overland trucks. Increased accessibility due to improved roads and drains in many areas of Kahama will help promote tourism.

4.4.6 Eco Tourism

To promote domestic and international tourism, most important areas identified by Government of Tanzania are development of infrastructure, product development and diversification, development of eco-adventure sports, cultural presentations, providing inexpensive accommodation, streamlining facilitation procedures at airports, human resource development, creating awareness and public participation and facilitation of private sector participation. Availability of good infrastructure such as accommodation facilities, telecommunication services, roads, banks/bureau de change services and tour operators are an important tool for the development of competitive tourism industry. Accommodation facilities are important in attracting tourists. Therefore, information about hotels, camp sites and lodges are vital for the tourists, as it helps them to choose the type of accommodation they like as well as compare the quality against prices charged. In Kahama Municipal Council the Shinyanga to Kigali and Bujumbura and DRC Congo Road ways plays a key role in the eco-tourism development. The road provides easy communication between the Council and other big commercial cities in Tanzania like Dar es Salaam and Mwanza which encourage more people to come in search of business opportunities, mining activities as well as those who come for tourism purposes. The available accommodation facilities which range from hotels to guest houses are to a large extent located at the centre of the Kahama district and the Kahama Municipal Council in general. In this regards, construction of new accommodation facilities

become a pressing issue. There is also a need of increasing the number of financial services such as banks, bureau de change etc., so as to meet the higher demand of these services in the near future. In Kahama Municipality, there are number of executive hotels and guest Houses including the following Submarine Hotel, Mongo Hotel, Buzwagi view Hotel, Pine Ridge Hotel. The proposed roads will make most of these hotels in different areas of Kahama CBD more accessible.

4.4.7 Industrial Development

According to the National Bureau of Statistics (NBS), enterprises are grouped into three categories according to capital outlay and number of people employed:

- Micro industries are those employing less than 50 people and with capital of less than TZS 5 million.
- Small-scale industries are those with capital of more than TZS 5 million but less than TZS 200 million and employing less than 50 people.
- Medium scale industries are those with capital of more than TZS 200 million but less than TZS 800 million and employing less than 100 people.
- Large scale industries are those with capital of more than TZS 800 million and employing more than 100 people.

Through the 2012 census, Kahama Municipal Council realized a total of 473 small scale industries of which 5 are Food processing industries and 467 milling machines and 1 honey processing industry.

In Kahama Municipal there is special zone which has been planned and allocated for small scale Industries and Industry. This zone has 2160 acres of which 500 acres have been surveyed and allocated. Development project budget trend for the Kahama Municipal for the past 2 years has been increasing and the council has allocated 2,500 acres Potential Investment Areas for small and heavy industries at Zongomela ward. Currently, Kahama Municipality has inspected the 5 available food processing industries which are registered by TFDA among which 3 are medically examined (**Table 18**). The proposed roads will make transportation of industrial raw materials as well as finished products to consumers in different areas.

Table 18: Production for 2013/14-2019/20 Crop season

Crop	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Maize	22598.25	19139.4	26683.6	12342.6	34174.6	21647.9	38,500
Rice	28096	30635.2	44607.6	21194.2	39503.4	27082.2	69,900
Bulrush millet	0	0	0	0	1	0	0
Sorghum	67.2	27.5	21.4	257.8	252.1	7.5	10.800
Cassava	5437	12339.7	4987.5	5375.4	13433.9	5995.9	24,000
Sweet potatoes	3981.5	14120	9583.8	62239.6	60875.6	27498.6	19,700
Beans	439.5	372	920.3	312.9	974	473.4	659.5
Bambara nuts	71.3	49.5	39.4	54.2	377.8	90.4	260.0
Groundnuts	3061.4	2426.9	9033.5	3184.9	5399.5	8409.2	705.36
Cotton/	575.83	134.2	108.3	125.7	287140	262057	23.37
Sunflower	441	493.9	524.8	174.2	1088.5	1038.9	795

Grams	1	2	29.4	24.5	17.5	0	-
Cowpea	5.2	409.5	857.7	206.9	682.5	1285.5	823.4
Cheakpea					96.3 tons		260.8

4.4.8 Irrigation

Kahama Municipal Council is endowed with the suitable land for irrigation about 4000 Ha out of which total area of more than 1,200 acres (485 ha.) of plain land is potential for irrigation at Malenge village, 500 ha at Bumbiti “A” Village in Mondo, investors are welcome help Kahama MC population to move away from subsistence to a more commercial mode of production through reliable irrigated agriculture which has proved to be an essential tool for combating food shortages, and alleviating hunger and poverty in other areas. In Kahama Municipality, the basic irrigation infrastructures, required for effective provision of good Agricultural yields includes: dams, water trough, main canal, secondary canal and tertiary canal.

4.4.9 Livestock Sector

Apart from growing crops the residents also practice livestock keeping as an alternative source of income. Livestock is the second important economic activity for the residents of Kahama Municipality. The livestock kept are cattle, goats, pigs, sheep, donkeys and poultry. The livestock sector makes significant contribution to food security and poverty eradication at household level. Besides, the subsector is an important source of protein through meat, milk and poultry products. Livestock is the second important economic activity for the residents of Kahama Municipality. To large extent, livestock keeping is predominantly traditional and involves mostly indigenous chicken. Other livestock kept are cattle, goats, sheep, donkeys, pigs and chicken.

Although less than 0.5% of the labour force is engaged exclusively in livestock rearing in the urban areas as compared to about 1% in the rural areas of Kahama Municipality, the total economic value of this activity is significant. Traditional cattle are reared usually through free ranging in rural areas, and in the urban periphery improved dairy stock are usually stall fed. About 3.8% of the area of the Kahama Municipality is used for livestock husbandry. Men (1.1%) are more likely than women (0.8%) to be involved in Cattle keeping. Farmers are supported through the public agricultural extension and disease control services by Kahama Municipality. One of the general distinctiveness of farming in the Kahama MC is the domination of continuation farming undertaken by smallholder peasants with very diminutive commercial inclinations in their husbandry practices. Most of them use low yielding plant seeds and livestock breeds, with minimal application of yield boosting inputs such as fertilizers and disease prevention applications. Crops are cultivated on approximately 106,181.6 hectares which is suitable for agriculture. The proposed roads will be promoted the livestock sector because there will be improved transportation of the livestock products to consumers.

4.5 Food Crops

4.5.1 Food Security

Food security refers to a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Main food crops produced in Kahama Municipality are maize, cassava, sweet potatoes, sorghum, groundnut, millet and beans. Cotton and rice constitute the main cash crops. Maize is most important cereal grown. It is cultivated on about 16,480 hectares. However, due to generalized use of local seeds with

lower productive capacity, yields are often poor than would have been the case with improved varieties. The proposed roads will increase accessibility hence easy transportation of food products and therefore increase food security.

4.5.2 Cash crops

Most predominant cash crop planted in Kahama Municipality which are income earning crops. They include cotton, tobacco and chickpea. Cotton and Tobacco are one of the most important cash crops in the Kahama Municipality but less now because of a fall in prices in the world market. Farmers are trying to revive production with assistance of various companies. The proposed roads will increase accessibility hence easy transportation of cash crops and therefore increase farmers income and the municipality's economy.

4.6 Infrastructure

4.6.1 Roads

The road network is a crucial means of transportation for both goods and services. It enhances the movement from one area to another and also allows social interactions. A high-quality road network is important for connecting key areas as well as the isolated local communities, improving domestic firms' investment decisions and also determining the Council's potentiality to investments. The roads are the most important means of transportation in Kahama Municipality. In Kahama Municipality, major roads are highly passable throughout the year but collector and feeder roads are not passable especially during rainy season. The roads are affected leading to poor accessibility to various community facilities. Kahama roads are in various conditions basing on the road inventory survey done, there were tarmac roads, earth and gravel roads. The proposed project will lead to improvement of these roads make them passable as well as reduce floods due to the presence of the side ditches.

Tarmac roads

Kahama Municipality is served by three major tarmac roads which passes through the CBD area these are: -

- Isaka road with total length of 5.25 km (**Figure 10**)
- Tabora road with total length of 6.42 km
- Lumelezi road with total length of 4.46 Km.



Figure 13: The tarmac trunk road from Isaka to Bujumbura (Rwanda) which passes outside the CBD area (Source: KMC, 2017)

The municipality has a road network of 951.52km of which 16.13 Km are tarmac, 67.88 Km are covered with gravel and 870 Km are earth roads. The current roads status in the municipality are shown in **Table 19**.

Table 19: Road Type and Condition in the Municipality

Type	Condition	Kilometers
Tarmac	Good	10.7
	Fair	02
	Bad	00
Gravel	Good	19
	Fair	26
	Bad	22.88
Earth	Good	90.05
	Fair	214.73
	Bad	870.94
Total		951.52

Source: TARURA KMC Records (2019)

Earth and gravel roads

The earth and gravel roads have covered large area of CBD which connects the different activities at CBD area. These roads are of great potential because they provide a good linkage and serves large community (**Figure 11**).

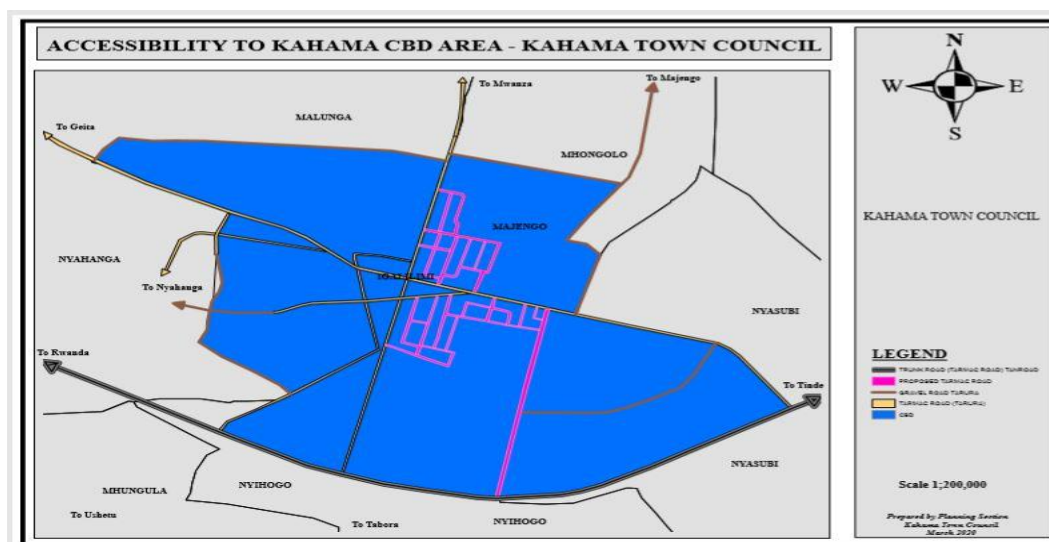


Figure 14: Road network in Kahama Municipality

4.6.2 Air Strip

Kahama can easily be accessed by other different modes of air, train, water and from all the major cities of the East African Community. There is an Air strip at Mwendakulima which serves visitors who usually come to Kahama Municipality. Precision Air, a private airline whose flight time is about two hours from Dar es Salaam to Kahama, is the fastest mode of transport. The flight is currently scheduled three times a week to meet the demand of the customers at an affordable price (**Figure 12**).



Figure 15: Kahama Airport

The current Mwendakulima Airstrip caters for international and local visitors who usually come to Kahama Municipality. It is located 08km from Kahama CBD with three times a week scheduled flights to meet customers demand at an affordable price. The presence of this airstrip encourages aviation industry operators and definitely cargo and passenger operating from Kahama Municipality. The Mwendakulima airstrip has currently been serving aircraft consignment both for passengers and goods cargo that records a three times weekly flight from Precision. The proposed roads will make it easy for the passengers access the airport and travel on time.

4.6.3 Electricity

The Kahama Municipality receives 80% of its daily demand of electricity from main secondary feeders. Electricity supply is drawn from the national grid system. Electricity is used for commercial, domestic, institutional and industrial purposes. All wards are served with hydroelectric power from National Grid System. Electricity is one major part of energy in Kahama Municipality. Electricity is commonly used in Kahama Municipality and rural parts of the council. Electricity supply which is a prerequisite for proper functioning of nearly all sectors in the economy in Kahama District stimulates development, both social and economic. Like other parts of the country, TANESCO is the sole supplier of electricity in Kahama Municipality. A good number of institutions in the council have been connected with electricity. Number of domestic installations has each day been increasing all together with commercial segment of customers. The proposed road construction is likely to affect electricity supply for some time because there will be a relocation of infrastructure in some areas. The proponent will have to liaise with TANESCO to ensure the people are informed of the road works and how they will affect the electricity supply.

4.6.4 Water Supply

Kahama Urban Water and Sanitation Authority (KUWASA) is the main supplier of clean and safe water in the Municipality. The sources of water are Lake Victoria, natural springs, boreholes and rain water harvesting at a small scale. The current daily water production of KUWASA is 11,087 cubic metres. It is estimated that 70% of Kahama MC is covered with 16,957 clients' connection and 70% of the population has access to water managed by KUWASA. Clients are metered and charged for water used on monthly basis. From the

Kahama Municipal Five-year strategic plan reveal that, the main source of water supply in Kahama is from Lake Victoria with a total length of distribution network approximately 240 km with 200km UPVC and 14km of steel pipes (**Figure 13**). The proposed project will have a water use permit to obtain water from available schemes for construction activities which can result to the decreased water level if there will be over abstraction.

Isagehe-Water Tanks

The current supply of water in Kahama Municipal Council is adequate. About 84,074 households had reliable and safe sources of water by the year 2019 (**Table 20**).

Table 20: Number of Households with Reliable and Safe Sources of Water in Kahama Municipal Council 2015- 2019

LGA	2015	2016	2017	2018	2019
Kahama MC	60,870	64,550	65,775	80,054	84,074
Total	60,870	64,550	65,775	80,054	84,074



Figure 16: Water reservoir tanks in Isagehe, Kahama

4.6.5 Waste Management systems

Kahama Municipal Council has nine (9) collection points which are located in area where the rate is higher than the collection capacity in unplanned areas and some are just free land, and some areas there is no collection points people have tendency of throwing the waste in the soil despite the presence of collection point. 12 urban Wards are operated by community-based organization, the collection system in Kahama Municipal Council is door to door collection whereby community-based organization (CBO) is passes along the roads, household, Institutions and entrepreneurs to collect all wastes stored in plastic sacks and dustbins. The door-to-door collection is being conducted with pushcart or 'guta' (tricycle) for transportation to the collection Point. The transportation of wastes from collection point to dumping site is conducted by hired company where the Kahama Municipality cannot conduct the service due to lack of equipment.

Ward Committee and street leaders play major role in management of solid waste. Each Ward Environmental/Health Officer is responsible for coordination and management of the service by doing inspection for each street and household. Liquid waste is disposed of through pit-latrines, and septic tanks. Residents are serviced by cesspit emptier owned by the private operators. Paid for washrooms are also available at the central bus terminal and the markets. Kahama like other urban areas in Tanzania is facing the Solid Waste Management (SWM) problem. The trend seems to worsen particularly in Kahama Municipal Council due to social economic activities and escalating population growth. In the year 2020 Kahama MC was estimated to have a population of 313,902 and production of solid waste was 170 tons per day while the capacity to collect is 51 tons per day (30%), and recycling capacity of 79 tons/day. 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 by ensuring waste is properly disposed of and where possible recycled. During the project implementation especially construction phase, the workers will be provided with proper toilet facilities that may temporarily serve them to avoid polluting the environment by open urination and defecation.

4.6.6 Telecommunication and data transmission

Communication services that are available in the Kahama Municipality include postal services, telephones, private carriers and internet. Postal services that include handling of cargo and mail, money transfers, sale of postage stamps and Expedited Mail Services (EMS) are handled by the Tanzania Postal Corporation (TPC). Internet cafes and services are provided by Tanzania Telecommunication Company Limited (TTCL) and other private providers. There are three local radio stations namely Kahama FM, Divine FM and HUHESO FM radio. Telephone services are provided by TTCL, Tigo Tanzania Millicom International Cellular, Airtel, Vodacom, Halotel and Zantel. Some of the Municipal institutions are connected to the National Fiber Optic Network. The proposed project may affect telecommunication services since the road construction can affect fibre found along the roads hence require relocation.

4.7 Social Services

4.7.1 Health Sector

Provision of good health service is important element required for National development as it has been visualized from the council levels, poverty alleviation and other health development gains needed by all Tanzanians. To achieve this, the Government has emphasized on delivery of equitable and quality preventive, curative and rehabilitative health services at all levels. Provisions of health services in Kahama Municipality are still below the nation and international standards requirements. The council still has inadequate number of doctors, health infrastructure and facilities. Moreover, inadequate number of doctors limited provision of curative and preventive health services such as operations, professional assistance and advices, mother and child health facilities, diagnosis of illness due to shortage or lack of medical machines and equipment, to mention a few. This is evidenced by high rates of infant and child mortality as well as maternal mortality rate. However, health services can be improved through formulating incentives which will motivate doctors and other health workers to work in rural areas. One of the council's priorities is to construct dispensaries in every village and one health centre in every ward by both public just as guided by the national plans. Investors are highly invited to help both public and private sectors to adhere for increasing accessibility of health services to Kahama Municipality's population.

4.7.2 Health Facilities

Kahama Municipal Council has a total number of 43 health facilities, including 2 hospitals, 5 health centers and 34 dispensaries and 2 clinics. The available health services are under ownership of the government, FBO, private and Parastatals. The number health workers provide services do attend both in and out patients of the entire population of the council and from outside the council (**Table 21**). The proposed roads will increase accessibility to these health facilities.

Table 21: In patient Top Ten Diseases/Diagnosis in KMC

S/N	Diagnosis	< 5 years		Diagnosis	5+ years	
		Admission	Death		Admission	Death
1	Normal deliveries	0	00	Normal deliveries	99,711	223
2	Malaria severe	22,504	335	Malaria severe	55,321	661
3	Other diagnosis	2285	0	Other diagnosis	33,090	00
4	Anemia	11,762	223	Anemia	11,590	223
5	Cardiovascular Disease	116	00	Cardiovascular Disease	22,813	22
6	Malaria Uncomplicated	6626	99 M	malaria uncomPLICATE	21,561	99
7	Pneumonia	11400	110	pneumonia	6668	44
8	Emergency surgical conditions	5564	0	emergency surgical conditions	11,411	00
9	Diarrheal disease	11055	119	diarrhea disease	4412	77
10	Clinical AIDS	33	0	clinical AIDS	4456	113

Source: TMOs Office DHIS2 (2019)

HIV/AIDS and TB

The prevalence of HIV at Kahama Municipal Council is 4.8% and large burden of PLHIV 25,871 and among them 11,326 (43.8) are on ART (HMIS data 2017). Various efforts have been in place to combat HIV by government; which include increasing HIV testing sites, to expand Care and Treatment clinics and PMTCT sites to reach many people in need of the services, HIV Viral Load testing and test and treat program so that once your diagnosed and started on ARTs however support from other stakeholders is also necessary. The prevalence of TB is 528/100000 and total number of clients diagnose to have Tuberculosis was 644 among them TB/HIV clients was 294 (45%), Health facilities providing TB services within the council is 18 (HMIS 2018). During the implementation of the proposed project, the number of victims for HIV/AIDS is likely to increase due to immigration of people from different areas interacting with native people in Kahama.

4.7.3 Education Sector

This section deals with provision of education in the council as one of the basic human rights. The system of education as set by the Ministry of Education and Vocational Training is divided

into Pre- Primary, Primary and Secondary, Colleges and Universities and Vocational education. Ministry of Education and Vocational Training campaign is to have pre-primary school in every primary school. Theoretically, pre-primary education serves children aged five to six years (Ministry of Education and Culture, MOEC, 2006) although some children below age five attend pre-primary schools. The proposed roads will make it easy for people to access schools, universities and other academic institutions. It will also lead to increased number of pupils and students as a result of immigration of people from different areas during implementation and after wards since the roads will make Kahama more urbanized hence increase population influx.

Primary Education

Primary education in Kahama Municipal Council comprises five sections namely; Statistics and Logistic, Academic, Adult Education, Special Needs Education as well as Cultural and sports section. Kahama MC primary education department has four centers for special needs education. The centers are divided into various units including visually impaired, hearing impaired, as well as dumb and albinism. The centers are located at Kahama, Nyasubi, Kishima A and Ubilimbi (**Table 22**).

Table 22: Centre for Special Needs

School	No. of Centers	No. of pupils		
		Boys	Girls	Total
KAHAMA	1	8	13	21
NYASUBI	1	13	7	20
KISHIMA A	1	7	4	11
UBILIMBI	1	3	2	5
Total	4	31	26	57

Source: Kahama Municipal Report (2019)

Number of Primary School and enrolment

Kahama Municipal Council has total of 113 whereby 80 being government primary schools and 32 private schools with a total of 94,654.00 of which 46,404 being boys and 48,250 being girls in government schools. While, in private schools the total enrollment is 6957 of which 3,594 being boys and 3,363 being girls. Also, in government pre-primary the total enrollment is 7,943 where by 3,885 being boys and 4,058 being girls. While, in private pre-primary school the total enrollment is 1,019 whereby 499 being boys and 520 being girls (**Table 23**).

Table 23: Number of primary school and enrollment

Schools	Total	Pre-Primary Enrollment			Primary Enrollment			Grand Total		
		B	G	T	B	G	T	B	G	T
GOVERNMENT	72	3012	3075	6087	38644	40615	79259	41656	43690	85,346.00
PRIVATE	23	534	510	1044	4214	4050	8264	4748	4560	9,308.00

TOTAL	95								48,250.00	94,654.00
		3546	3585	7131	42858	44665	87523	46,404.00		

Source: KMC- Primary Education Department (2020)

Number of Secondary Schools

Kahama Municipal Council secondary school department has a total number of 35 secondary schools. 31 of the total secondary school available are ordinary level secondary schools (form I-IV), whereby 16 being government schools and 16 private schools. Also, KMC has 4 advanced secondary level (form 1-VI) 2 being government schools and 2 private schools (**Table 24**).

Table 24: Number of Secondary Schools in the Kahama Municipal Council

Level	Government	Private	Total
O – level	16	15	31
A – level (I-VI)	2	2	4
Total	18	17	35

Source: KMC-Secondary Education Department (2020)

4.8 Environmental Baseline Conditions

4.8.1 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 eight (8) readings were taken 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 Table 25. The lowest and the highest values were recorded and then compared with local standards, Tanzania Bureau of Standards (TBS). The study took place on 31st December, 2022 between 08:10 am to 16:20 pm for proposed project areas in Kahama Municipality.

Table 25: Sound Levels Monitoring Data at Kahama Central Business District (Roads)

Date dd/mm/yy	Location	Coordinates (Degrees)	Sound level (dBA) (Accuracy ± 3.5 at 94 dBA)		
			Lowest	Highest	Average
31.12.2022	Junction Isaka/Rusumo Road	S03.835836 E32.615322	67.9	69.1	68.5
31.12.2022	NHC Area	S03.829252 E32.601743	57.6	57.9	57.8

31.12.2022	Kahama MC/NSSF	S03.823584 E32.589919	57.1	57.6	57.4
31.12.2022	Junction Kahama Municipal Hospital & Kahama School	S03.824849 E32.595964	58.6	59.3	59.0
31.12.2022	Junction Msalala & Selestine Roads	S03.824901 E32.599825	50.6	51.1	50.9
31.12.2022	American chips Area	S03.827751 E32.600138	51.7	52.2	52.0
31.12.2022	Mama Farida Road	S03.831237 E32.604266	58.1	58.4	58.3
31.12.2022	TASAF Road	S03.832229 E32.598880	55.4	56.1	55.8
Tanzania Standards as per Tanzania Bureau of Standards (TBS) 70 dBA					
IFC Noise level Guidelines for Industrial and commercial receptors 70 dB(A)⁶					

(Source: Primary data/ Consultant, 2022)

4.8.2 Combustion Gaseous Emission Concentrations (Flue Gases)

There is no official record of secondary flue gas emission data due to non-availability of a regular flue gas emission monitoring program for flue gas conditions or emissions. The main sources of air pollutant emissions are from diffuse sources such as combustion of carbon-containing fuels in a limited oxygen gas supply. Air quality was measured under this project. The samples were collected from onsite points of the project site by using Digital Gas Analyser HD4400. The present condition of the air quality is presented in Table 1 for all proposed road project sites. From the test results, it is found that the site has no gaseous contaminants of all flue gases such as Sulphur dioxide (SO₂), 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 – Specification⁷ and this is one of the nine compulsory environmental standards developed by the Tanzania Bureau of Standards and collated in the National Environmental Standards Compendium. In general, the air quality standards contain the same tables of limit or guideline values as the regulations as shown on Table 26.

Table 26: Findings of Flue gases at Kahama Central Business District (Roads)

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)
31.12.2022	Junction Isaka/Rusumo Road	S03.835836 E32.615322	80.40	87.60	20.80	0.00	0.00	1.05	0.00	-7.2
31.12.2022	NHC Area	S03.829252 E32.601743	83.30	86.60	20.80	0.00	0.00	1.05	0.00	-3.3

⁶

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

⁷ <https://www.tbs.go.tz/uploads/files/list%20of%20compulsory%20tanzania%20standard%20as%20of%20september%202021.pdf>

31.12.2022	Kahama MC/NSSF	S03.823584 E32.589919	79.20	87.10	20.80	0.00	0.00	1.05	0.00	-7.9
31.12.2022	Junction Kahama Municipal Hospital & Kahama School	S03.824849 E32.595964	83.30	89.20	20.80	0.00	0.00	1.05	0.00	-5.9
31.12.2022	Junction Msalala & Selestine Roads	S03.824901 E32.599825	81.30	90.30	20.80	0.00	0.00	1.05	0.00	-9.0
31.12.2022	American chips Area	S03.827751 E32.600138	87.80	91.40	20.80	0.00	0.00	1.05	0.00	-3.6
31.12.2022	Mama Farida Road	S03.831237 E32.604266	87.30	93.40	20.80	0.00	0.00	1.05	0.00	-6.1
31.12.2022	TASAF Road	S03.832229 E32.598880	86.60	95.50	20.80	0.00	0.00	1.05	0.00	-8.9
Tanzania Bureau of Standards (TBS) Limits			-	-	-	0.01	0.00012	0.00012	0.0005	

(Source: Primary data/Consultant, 2022)

4.8.3 Temperature and Relative Humidity

Temperature and Relative Humidity measurements in the selected areas within the project site were done using Environment Test Meter, Model NO9AQ, 4 – in – 1 digital multifunction environment meter with measurement range of -20°C to +750°C (-4°F to +1382°F) for temperature and 25% to 95% Relative Humidity (RH). Equipment accuracy is $\pm 3/3.5\%$ reading $\pm 2^\circ\text{C}$ (at -20°C~+200°C) and $\pm 5\%$ 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 metres away from hot objects. A set of eight (8) readings were taken per points and the selection of individual testing points included areas where people were working and also ensured to capture the centre of project. The values were recorded and then compared with meteorological data from Tanzania Meteorological Authority (TMA) (**Table 27**). The study took place on 31st December, 2022 between 11:30am to 16:20 pm for proposed project areas in Kahama Municipality.

Table 27: Temperature and Relative Humidity Monitoring Data at Kahama Central Business District (Roads)

Date dd/mm/yy	Location	Coordinates (Degrees)	Temperature (°F)	Relative Humidity (%)
31.12.2022	Junction Isaka/Rusumo Road	S03.835836 E32.615322	27.7	57.0
31.12.2022	NHC Area	S03.829252 E32.601743	28.5	50.5
31.12.2022	Kahama MC/NSSF	S03.823584 E32.589919	29.1	52.8
31.12.2022	Junction Kahama Municipal Hospital & Kahama School	S03.824849 E32.595964	28.5	43.4
31.12.2022	Junction Msalala & Selestine Roads	S03.824901 E32.599825	29.6	37.0
31.12.2022	American chips Area	S03.827751 E32.600138	29.3	36.9
31.12.2022	Mama Farida Road	S03.831237 E32.604266	28.7	33.9
31.12.2022	TASAF Road	S03.832229 E32.598880	28.6	31.4

(Source: Primary data/ Consultant, 2022)

4.8.4 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, NO₂ and CO₂ in ppm, PM₁₀ in µg/m³, PM_{2.5} in µg/m³, TVOC in mg/m³, temperature and humidity in the environmental air. The study took place on 31st December, 2022 between 11:30am to 16:20 pm for proposed project areas in Kahama Municipality. 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 PM₁₀ found to range between 3 and 38 µg/m³ and between 5 and 61 µg/m³ respectively. Based on the results, the average PM_{2.5} and PM₁₀ 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 28**. The average measured concentrations of Total Volatile Organic Compounds (TVOC), Carbon monoxide (CO) in ppm, Nitrogen dioxide (NO₂) in ppm and Carbon dioxide (CO₂). 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 cause air pollution during its implementation hence proper mitigation measures should be taken reduce the extent to which the environment as well as people may be affected.

Table 28: Average values of dust levels measured at the proposed Kahama Central Business District (Roads)

Location	Coordinates (Degrees)	Measured Dust Parameter		TVOC (mg/m ³)	NO ₂ (ppm)	CO ₂ (ppm)	CO (ppm)
		PM _{2.5}	PM ₁₀				
Junction Isaka/Rusumo Road	S03.835836 E32.615322	16	25	0.13	0.1	346	0.0
NHC Area	S03.829252 E32.601743	13	16	0.12	0.0	321	6.5
Kahama MC/NSSF	S03.823584 E32.589919	5	6	0.11	0.0	293	7
Junction Kahama Municipal Hospital & Kahama School	S03.824849 E32.595964	3	5	0.10	0.0	303	0.0
Junction Msalala & Selestine Roads	S03.824901 E32.599825	11	19	0.12	0.0	310	0.0
American chips Area	S03.827751 E32.600138	38	61	0.14	0.15	337	13
Mama Farida Road	S03.831237 E32.604266	11	32	0.13	0.2	328	0.0
TASAF Road	S03.832229 E32.598880	5	10	0.12	0.1	316	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: Primary data/Consultant, 2022)

4.8.5 Ground Vibrations

Ground vibrations were measured at 8 points of the proposed CBD roads project site that represented onsite and offsite receptors. The detached probe-type vibration meter model TA8663 was utilized to quantify the ground vibration in the study area. The meter has an accuracy of $\pm 5\%$ ± 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 level was 1.475 mm/s (**Table 29**). The proposed project has the potential to increase the ground vibration levels from its construction activities like movements of heavy equipment and trucks, etc., as well as during operation phase due to vehicle movement.

Table 29: Ground vibration levels at the proposed Kahama Central Business District (Roads)

Location	Coordinates (Degrees)	Ground vibrations (mm/s)
Junction Isaka/Rusumo Road	S03.835836 E32.615322	3
NHC Area	S03.829252 E32.601743	2.8
Kahama MC/NSSF	S03.823584 E32.589919	2
Junction Kahama Municipal Hospital & Kahama School	S03.824849 E32.595964	0.4
Junction Msalala & Selestine Roads	S03.824901 E32.599825	0.7
American chips Area	S03.827751 E32.600138	0.4
Mama Farida Road	S03.831237 E32.604266	1.0
TASAF Road	S03.832229 E32.598880	1.5
Average		1.475
Environmental Management (Standards for the Control of Noise and Vibrations Pollution) Regulations, 2015		5 mm/s PPV at all times

(Source: Primary data/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 EIA. 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 LGA level with the Municipal Director and his team, wards and mitaa levels where the roads are passing. The comments received and issues raised from these public participation exercises have incorporated not only to enrich the report but also included as part of the report. 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 list as shown in (Figures 17 to 20).

1. Kahama District Council including the District Executive Director and the entire team (legal, community development, environment, physical planning, engineering)
2. Kahama Urban Water Supply and Sanitation Authority (KUWASA)
3. TANESCO, Kahama Office
4. Association of people with disabilities
5. Association of traders along the proposed roads
6. Representatives of the Association of taxi drivers parking in various points along the proposed roads
7. Office of the Mayor of Kahama Municipal Council

8. Mini bus stand users
9. All wards where the proposed roads are passing
10. All mtaa officers where the proposed roads are passing
11. Communities in all areas where the proposed roads are passing

5.2.2 Public Meetings with Local People

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



Figure 17: Meeting with the local leaders and representatives Nyihogo Ward for the road construction (Source: Consultant, January 2022)



Figure 18: Meeting with local Leaders at Malunga Ward (Source: Consultant, January 2022)



Figure 19: Meetings with leaders and Majengo -Mhongolo Ward (Source: Consultant, January 2022)



Figure 20: Meeting with the local leaders and representatives Bodaboda, Bajaji and Tax drivers (Source: Consultant, January 2022)

Stakeholders' Comments

The concerns of the stakeholders are presented in **Table 30**. Some of the concerns are related

to designs while others are concerned about operation of the project especially the proposed roads.

Key issues raised by stakeholders were as summarized here under:

Stakeholders' categorization: It was suggested that all stakeholders should be visited and their recommendations and concern gathered to ensure that there are no complaints or grievance at later stage of project development. Issues of proof of ownership of land where these projects will be implemented was also emphasized to avoid conflicts over land ownership.

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

Interaction between local communities and influx of 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.

Table 30: Stakeholders comments for the proposed upgrading CBD roads and rehabilitation of the storm water drain under TACTIC in Kahama Municipality

S/N	GROUP CONSULTED	ISSUES/CONCERNS	RESPONSE
1.	<p>Kahama Municipal Council</p> <p>- Anderson David Msumba (Municipal Director)</p> <p>- Clemence Mkusa (Municipal Urban Planning Officer)</p> <p>- Robert Kwela</p> <p>- Ibrahim Kuguru (Ag. Municipal Environmental Management Officer)</p> <p>- Flora K. Sangiwa (Municipal Planning Officer)</p> <p>Enne Moses (Municipal Architect)</p>	<ul style="list-style-type: none"> • There are title deeds for all the proposed project areas. • There are no conflicts or pending compensation issues. • The project is consistent with the masterplan/ Municipal plan. • Local government leaders, residents and traders have been consulted and made aware of the proposed projects under TACTIC. • The proposed developments should be designed in a way that they are manageable. • Involvement and consideration of the needs of people with disabilities in the proposed projects. The challenges and deficiencies with the current infrastructure design is inclusivity. The need for people with disabilities were not considered like putting wheelchair ramps in buildings. • Work force is available to help in the project implementation. 	<ul style="list-style-type: none"> • Noted • Noted • Noted • Noted • The designs have taken into consideration. • The designs have considered inclusivity hence PwDs needs have been accommodated. • Positive
2.	<p>Tanzania Rural and Urban Roads Agency (TARURA)</p> <p>- Eng. Joab Mutagwaba (District Manager)</p>	<ul style="list-style-type: none"> • The proposed projects are known. • The project shall have a positive impact to the community of Kahama by increasing road length and accessibility thus reducing unnecessary congestions and the constructed drainage will remove flooding nuisance. • If there will be no proper destination/disposal point of storm water, the proposed drainage construction will have a negative impact. Hence, there is a need to have a reliable destination/ end point of the storm water in drainage to avoid stagnation and flooding to people's homes. • The Municipal Council, contractor and consultants should cooperate with TARURA to ensure a smooth undertaking of the projects and the office is ready to offer a helping hand and their views. 	<ul style="list-style-type: none"> • Noted • Positive • The proponent and the designing team shall ensure the endpoint for the stormwater collected by drains is reliable and avoid impacts the environment and community. • Noted.

3.	<p>Tanzania Electric Supply Company Ltd (TANESCO)</p> <p>- Said Hamad (District Operations Engineer)</p>	<ul style="list-style-type: none"> • The project is known. the PIU consulted the office to let them know of the proposed projects. • The PIU consulted the office to let them know of the proposed projects and TANESCO gave them the utilities layout. • The project is likely to affect their infrastructure because there are some areas where they will be required to remove the polls and wires to give way for construction to take place. The PIU will have to notify TANESCO by letter if there will be a need for relocating utilities that may be impacted by the project and provide necessary costs for the relocation. 	<ul style="list-style-type: none"> • Noted. • Noted. • During implementation the proponent shall liaise with TANESCO to ensure relocation of the affected infrastructure is done smoothly without interfering with the electric supply and avoid shortage for a long time which will affect the consumers.
4.	<p>Kahama Urban Water Supply and Sewerage Authority (KUWASA)</p> <p>- Josephat John (Ag. PCE)</p>	<ul style="list-style-type: none"> • They are aware of the project. • The project shall have a temporary impact on the water utilities if there will be a need for relocation and it can cause losses if there will be no communication between the PIU and KUWASA. • The PIU shall notify KUWASA if utilities in some areas may require relocation and the budget shall be provided for the task to enable the process and smooth undertaking of the project. • The PIU needs to consult KUWASA prior construction to know of the water supply network where the project will cover and if they can be affected and what should be done. 	<ul style="list-style-type: none"> • Noted • The proponent shall liaise with KUWASA to ensure all the affected water infrastructures are timely relocated and cover the cost for that to ensure the project does not affect the water consumers in the area.
5.	<p>People with disabilities</p> <p>-Mbwana Karata (Vice Chairperson – CHAWATA)</p> <p>-Marco Kanjiwa (Chairperson – SHIVYAWATA)</p>	<ul style="list-style-type: none"> • They are aware of the project. • The roads should have cable stones for easy use by PwDs • Storm water drainage should be covered. • Important signs, there should be a translator for the deaf, Braille/tactile system for the blind in buildings and roads to render easy use for them. • Road education and awareness to the drivers of the vehicles on PwDs road signs and help them reduce accidents. 	<ul style="list-style-type: none"> • Noted. • Considered. • The designs have considered. • The designs have incorporated that. • The proponent will make sure of that.

		<ul style="list-style-type: none"> Consider the participation of PwDs in the project through providing employment opportunities whether temporary or permanent for the works they can perform. 	<ul style="list-style-type: none"> The proponent shall ensure inclusive participation by ensuring employment of PwDs during project implementation.
6.	<p>Local Government Leaders (Kahama Mjini, Malunga Ward and Igomelo Mtaa) and members of the local government committee</p> <ul style="list-style-type: none"> - Hamidu Juma (Councilor -Kahama Mjini) - Lameki Luvogera (Chairperson Kahama Mjini) - Mipawa Albert (Councilor – Malunga) - Christina S. Masegese (WEO- Malunga) - Fatma M Rashidi (Chairperson – Igomelo) - Grace N. Botana (MEO- Igomelo) - Beatrice P. Shirima (council member- Igomelo) 	<ul style="list-style-type: none"> The leaders know about the project. The land is owned by the government and there are no pending compensation issues/conflicts. The project is beneficial for the people since it will help solve the flooding problems. The drainage is going to be wide hence lids will be required where there are many residents for their safety. There needs to be a reliable disposal place or receiving end so that the stormwater from upstream does not lead to more problems downstream. If possible, a dam should be constructed and water in the dam can be used for activities such as irrigation and fishery. There should be bridges for accessibility where drainage passes home/business entrances. The stormwater drainage needs to be constructed with materials that will withstand heavy rains and fast-moving water to make it sustainable. The challenge is the unavailability of proper roads (roads are rough) that will help even more with the drainage sustainability. There are no cases of GBV and Sexual harassment so far. Work force is available; therefore, local people should be prioritized should there be work opportunities during the project implementation. 	<ul style="list-style-type: none"> Noted Noted Positive To be taken into consideration to ensure people's safety. The proponent and design time will make sure of that. To be taken into consideration. The designs have considered that. The proponent will make sure of that. The proposed roads upgrade will help eradicate that challenge. Noted. Positive
7.	<p>Local Government Leaders (Majengo and Mhongolo Wards and Mtaa leaders)</p> <ul style="list-style-type: none"> - Benard Mahongo (Councilor- Majengo) 	<ul style="list-style-type: none"> The local government leaders know about the projects. The land is owned by the government and there are no pending compensation issues/conflicts but in some areas some houses may be affected and Kahama Municipal Council said that they shall be compensated. 	<ul style="list-style-type: none"> Noted Noted

	<ul style="list-style-type: none"> - Michael M. Mizubo (Councilor – Mhongolo) - Yasini H. Mkwizu (WEO – Majengo) - Boniface Kisimbu (WEO – Mhongolo) - Dotto D. Magille (CDO – Majengo) - Patroba Prinatus (Chairperson - Sokola) - Jackson K. Zabron (MEO- Sokola) - Emmanuel Nangale (Chairperson – Mhongolo) - Damas J. Katyuka (MEO- Mhongolo) - Hamza Abdallah (Chairperson – Mbulu) 	<ul style="list-style-type: none"> • The water supply networks pass through where road and drainage system shall be constructed. The leaders shall ask KUWASA to be ready to leverage their networks by either relocating or installing them deeper to let the project be implemented. • The project is beneficial to the people because it will solve the problems of floods by constructing stormwater drainages since the ward is the receiving end of stormwater from other areas in Kahama. • There are residences, open space and then a pond downstream, therefore; it is necessary for the stormwater drainages to be properly designed and constructed without harming the houses and any other developments downstream leading to the pond which is the anticipated receiving point/endpoint. • There are some cases of GBV and Sexual harassment such as child abuse by parents and women being bitten by their husbands. 	<ul style="list-style-type: none"> • The Proponent shall liaise with KUWASA so that their infrastructure is relocated properly without causing any losses. • Positive • The proponent will make sure the drainage is well designed and constructed without causing damage to the existing developments. • The proponent shall ensure GBV issues are avoided so that everyone is comfortable during the implementation stage.
8.	<p>Community along the proposed roads and drainages.</p> <ul style="list-style-type: none"> - Mathias Musungwi - Grayson L. Chami - Mchele Malale - Kiselya Buluba - Clement Lushona - Amina Adam - Rugangila Vedastus - Jamila Kajehe - Laurent Nkwabi 	<ul style="list-style-type: none"> • The community is aware of the proposed projects. • There are no pending compensation issues but there are some areas that may be affected by the project. • The people are excited about the project and ready to participate whenever required. • The roads are rough and the area is prone to floods because there are no well-designed stormwater drainages. 	<ul style="list-style-type: none"> • Noted • Noted • Positive • The designs have taken that into consideration hence roads will have side ditches designed to accommodate the amount of stormwater anticipated.

	<ul style="list-style-type: none"> - Masonga Clement - Adnreas Jilari - Rahma Mohammed - Anania Miligo - Salum Rajab 	<ul style="list-style-type: none"> • The people will make sure that they help with ensuring the safety of the construction of materials and manage the roads and drainages after construction. • The drainages should be wide and deep to avoid possible destruction of buildings along which they pass when they are flooded. • There should be passages on drainages for cars and pedestrians at entrances of houses and other developments. • The drainages should be V-shaped made of concrete to prevent stagnation of water and dirt carried downstream. • There should be street lights on the road sides for safety of the pedestrians. 	<ul style="list-style-type: none"> • Positive • It has been considered. • The proponent will take that into consideration. • Considered since the drains will be trapezoidal. • They have been considered.
9.	<p>Local Government Leaders (Nyihogo Ward and Mtaa leaders)</p> <ul style="list-style-type: none"> - Sindano W. Machum (Councilor) - Cosmas M. Bukango (WEO) - Joseph D. Ngowela (Chairperson) - Iddy S. Mitimangi (Chairperson) - Mariam Lusagalika (MEO) - Antony Costa (MEO) - Beatrice S. Mngazija (WHO) - Cyril M. Nombo 	<ul style="list-style-type: none"> • The project is known by the local leaders. • The land is owned by the government and there are no pending compensation issues/conflicts. • The roads should be tarmac of good quality that can withstand all the pressure and weather conditions. • The PIU should make sure the local leaders are aware of all the project stages and closely engaged as they help in supervision and protection of construction materials to ensure its smooth implementation. • The people of Nyihogo are ready to take part in the project implementation. • There are some cases of GBV and Sexual harassment such as rape to young children by older men. 	<ul style="list-style-type: none"> • Noted • Noted • The proponent shall make sure only good quality materials are used for construction. • Upheld • Positive • The proponent shall ensure GBV issues are avoided so that everyone is comfortable during the implementation stage.
10.	<p>Community along the proposed roads</p> <ul style="list-style-type: none"> - Elizabeth John - Gloria Innocent - Asmini Toba 	<ul style="list-style-type: none"> • The people are aware of the proposed road construction project. • There are no assets that will be affected so far. • The improved roads will stir up business growth due to easy accessibility of the area. 	<ul style="list-style-type: none"> • Noted. • Noted. • Positive

	<ul style="list-style-type: none"> - Ramadhan H. Majid - Eunice Epaphla - Charles Kashinde - Emmanuel Sendama - Jumanne Malamu - Esther Matonge - Mary Ramadhan - Noel A. Sukwa - Michael Lameck 	<ul style="list-style-type: none"> • The greatest fear of the community is the delays by the contractor during project implementation that may result to long time closedown of business and decreased accessibility to the areas in the ward. • There should be streetlights (solar-powered) and traffic lights for safety and vehicle movement regulation. • There needs to be road signs and bumps to help prevent accidents due to high speed. • The roads should have drainages to manage stormwater and walking bridges on entrances of houses, street roads and other developments. • There needs to be pedestrian walkways and parking bays on roads. • The contractor should wet the roads during construction to reduce dust. • The houses along the road may be get cracks from vibrations of machines during road works hence careful undertaking of the project is required. • The challenges the community face include dust from rough roads with no road signs and the roads get muddy during rainy season. 	<ul style="list-style-type: none"> • The proponent shall ensure that the projects are carried out as scheduled. • They have been considered. • They have been incorporated in the designs. • Taken into consideration. • Taken into consideration. • The proponent shall implement that to protect public health as stated in the ESMP. • The proponent shall ensure damages are avoided and if it happens the proponent and contractor shall compensate for such impacts. • The proposed roads will help solve those challenges.
--	---	---	---

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 Kahama 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 Council will have different methods of collecting information based on their needs i.e., disadvantaged or vulnerable groups.

CHAPTER SIX: IMPACT ASSESSMENT AND EVALUATION

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:
- Resource loss/ecological damage
- Negative social impacts
- Foreclosure of land and resource use options
- Environmental loss and deterioration
- Probability and acceptability of risk
- Environmental sensitivity

Ecological

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

Social

- Displacement of people
- Human health and safety
- Decline in important local resource
- Loss/gain of valued area
- Disruption of community livelihoods
- Demands on services and infrastructure
- Public concern
- Political concern

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

-Spatial Scale- The spatial dimension encompasses the geographical spread of the impacts regardless of whether they are short term or long term. **Table 31** describes the ratings used in the Simple Matrix as far as spatial scale is concerned.

Table 31: 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 32** describes the ratings used in the Simple Matrix.

Table 32: 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 33** show types of cumulative impacts;

Table 33: 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 Environmental and Social Risk Classification of the project as per the World Bank ESF

Environmental and social risks are rated as **Substantial** due to environmental and social impacts likely to be caused by project activities. The WB ESS 1 to 10 except ESS 9 will all be applicable to assess and provide mitigation measures for the identified impacts. The main impacts of the proposed projects will emanate from the physical construction activities. No major land use change is expected because these activities will be implemented within the Kahama Municipal Council in existing land uses. Kahama Municipal Council already have a master plan therefore this project will finance implementation of activities which are already pre-determined within their areas. The cumulative impact of the works and presence of contractors and machinery on the project sites is unknown at the moment, but careful supervision will be needed to avoid accidents, loss of cultural assets and potential conflicts with local communities. Other potential impacts are related to (i) waste generated at construction sites which can pollute land and water bodies (cement mixing areas, metal, wood and paint residues, diesel, used electronics equipment and other residues); open pits in the soil can cause accidents; (ii) food residues can attract disease causing organisms; (iii) cutting of trees to use as building material (although this will not be allowed and construction materials will be supplied with the authorized vendor); (iv) road accidents; amongst others, (v) Health and safety issues especially during construction of Zongomela Industrial Park.

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

6.3 Spatial, Institutional and Temporal Boundaries

6.3.1 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.

6.3.2 Institutional Boundaries

Institutionally, have the mandate to develop and maintain the urban infrastructures in Kahama Municipal Council. 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 district engineers while solid waste collection and disposal will be under the Municipal council health officers. From the central government line of administration, by virtue of their location, the urban infrastructures to be developed by this project in Kahama Municipal Council is under the jurisdiction of the District Director.

6.3.3 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.

6.4 Impact Identification

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

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

- (a) Job creation and increased income
- (b) Land expropriation, loss of property and resettlement
- (c) Loss of employment and income

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

- (d) Job creation and increased income to local community
- (e) Destruction of other infrastructures
- (f) Soil erosion and instability of slopes
- (g) Increased Water and Soil Pollution
- (h) Noise, vibration and air pollution
- (i) Safety and health risks
- (j) Increase possibilities of road accidents
- (k) Increased Waste
- (l) Loss of Scenic Quality
- (m) Loss of Vegetation
- (n) Child Labour
- (o) Increased HIV/AIDS
- (p) Population Influx

(q) Dangers of Borrow Pits

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

- (r) Benefits to community resulting from employment
- (s) Improved Transport and economy of the people
- (t) Improved community life and services
- (u) Reduced traffic congestion
- (v) Increase property values
- (w) Increased road accidents

The interaction between the intended project activities and the different environmental receptors are summarized in a simplified matrix presented in **Table 34**.

6.5 Impact Rating

Taking into account the criteria stated in methodology section (1.6.3), A simple matrix with the following ratings was used to determine significance of the identified impacts stated in section 6.4 above:

+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 34: Environmental and Social Impacts Matrix for the Proposed Roads at the Kahama Central Business District

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

- Job creation and increased income

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

- Job creation and increased income
- Destruction/ relocation of other infrastructures
- Soil erosion and instability of slopes
- Increased Water and Land Pollution
- Noise, vibration and air pollution
- Safety and health risks
- Increase road accidents
- Increased Waste
- Loss of Scenic Quality
- Loss of Vegetation

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

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

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

6.6 Pre- Construction Phase

6.6.1 Positive social impacts

Job creation and increased income to local communities

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

6.7 Construction Phase Impacts

6.7.1 Positive social impacts

Job creation and increased income to local communities

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

6.7.2 Negative Environmental Impacts

Destruction/ relocation of other infrastructures

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

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

Soil Erosion and Instability of Slopes

Construction works would accelerate erosion problems in most cut sections and drains. 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.

6.7.3 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.

Occupational Safety and Health Impacts

On a daily basis, construction workers face dangerous employment conditions. Even though construction workers are trained and know basic safety measures, accidents can still happen. The risks taken every day during regular construction work make it difficult for job sites to remain accident-free. Accidents on site could be caused by defective or collapsing scaffold, electrocutions, falls, falls from ladders, and defective machinery such as forklifts, conveyors, hoists, cranes, malfunctioning tools and other equipment. Accidents can result in serious injuries or death. In case, construction is extensive, the potential significance of the risk to health and public safety will depend on the size of the population and the workers exposed and the degree of exposure. Workers permanently on the site will be exposed to air pollution throughout the construction period. Work accidents during construction work are quite common. This is due to the presence and handling of hazardous equipment and harmful building materials. It is therefore required that before the construction activities, there is need for the materials to be well inspected and harmonized to the occupational health and safety standards.

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.

Community Health – Communicable Disease Transmission

The construction of the project shall definitely be accompanied by in-migration of job seekers and opportunistic businesses and speculators. This will increase social interactions amongst the construction workers and local communities. The presence of a large number of workers can give rise to an increased spread of communicable diseases. This among other factors may also produce an inherent increased risk of transmission of sexually transmitted diseases, HIV/AIDS and other contagious diseases taking into consideration that the project will be implemented within within the Municipal council. In addition, the increase in disease like COVID-19 associated with the entry of a temporary labour force into community could also occur.

Community Safety – Social Conflict

It is expected that the increased number of workers and higher concentration of residents near construction sites will have an impact on local communities. Uncontrolled movement of workers will affect residents around the settlements. Also, the construction of the project shall definitely be accompanied by in-migration of job seekers and opportunistic businesses and speculators. This will bring many people in the project areas. This will increase social interactions amongst the construction workers and local communities. The presence of workers increases the risk of SEA/SH (GBV) towards members of the community in particular female students who may be present on campus. Such risks are known to occur on construction projects.

Entry of a temporary labour force into an area could cause different negative impacts to the local communities including conflicts between local community members and newly arrived people due to the socio-cultural differences and other issues. The situation when temporary workers come from other regions and they are from different social and cultural backgrounds could easily create conflicts with the local social environment. Due to this, workers must receive training and sign a labour code of conduct (**Appendix IV**), in order not to create conflicts with the local community.

Influx of temporary workers may have a potential increase in crime in the community. This may be experienced during the construction period if mitigation measures are not introduced. With an increase in construction activities and the possibility of job seekers arriving, it may be more difficult to identify strangers in the community. There may also be negative issues that need to be managed such as increases in local prices, increased rents, prostitution or alcohol consumption associated with labour influx or increased incomes of local workers. It is expected that contractors will hire staff to provide security for their camps and other properties. Increased presence of security personal can lead to community health and safety risks associated with any inappropriate use of force, GBV(SEA/SH) and intimidation of the community.

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 APIUs. 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 as described in this ESMF and subsequent LMP.

6.8 Operational Phase Impacts

6.8.1 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 Kahama 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 Kahama Municipal Council CBD area. Now most cars use the tarmac roads which are few and this cause congestion especially in the Municipality 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, Kahama Municipal Council districts and national income will increase through the property tax. However, the rise of property value will be disadvantage to tenants and investors.

6.8.2 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.

Community Health – Accidents and Injury

During the building works, the risks related on public safety and the personnel increase. The building works will induce possible harmful effects on public safety. The traffic related to construction will contribute to reduced road safety especially on local roads where some contractor's facilities are located, especially where the traffic passes through settled areas and Municipality located close to the road. The traffic to construction site will depart from the public roads. Residents from local settlements on these haulage roads will be exposed to increased possibilities for accidents and injuries. Traffic consisting of heavy vehicles and machinery is especially risky. The sources of the effects to public are identified in the **Table 35** and could occur along transportation routes or as a result of the community entering construction sites. Children can be at particular risk of such impacts if they are unaware of project risks.

Table 35. Sources of the harmful effects on health and safety

Type of harmful effect	Sources of the threat
Accident risk (falls, trips, road traffic accidents, etc)	<ul style="list-style-type: none">● During excavation work● Movements and operations of heavy equipment● Access to danger zones● Transport, handling and storage of the materials● Concrete batching and mixing plant● Modification made to the known plans of route
Indirect health risk	<ul style="list-style-type: none">● Environment Pollution● Contamination of water or food

6.9 Analysis of Alternatives

6.9.1 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:

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 Kahama Municipal Council districts.

Alternatives Sites

There are many roads and drains in Kahama which are in poor conditions than the selected project roads. However due to limited resources these roads and drains 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 Kahama Municipal area.

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.

6.9.2 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.

6.9.3 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.

6.9.4 Water Sources Alternative

The water source for the proposed project is water dams and schemes in Kahama CBD. This option was chosen the dams and schemes are capable of providing the amount of water that will be required for the proposed construction activities. Alternatively, water from KUWASA and 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 will be a waste of portable water too. Therefore, using water from these schemes and dams for the project activities will be a better choice for the proposed project.

6.10 Impacts Mitigation Measures

6.10.1 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.

6.10.2 Mitigation Measures for Construction Phase Impacts

Destruction of Public Utilities

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

Soil Erosion and Instability of Slopes

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

Increased water and soil pollution

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

Noise, Vibration and Air

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

Safety and Health Risks

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

Increased Road Accidents

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

Increased Waste Generation

- Adequate number of waste bins shall be provided at the construction sites
- Only inert materials or readily decomposable materials shall be disposed by burial.
- No burning of waste materials which produces black smoke shall be approved. Plastics shall not be burned.
- No open burning of oils shall be done
- The construction sites shall have adequate toilets with septic tank-soak away treatment system

Loss of Vegetation

- Close supervision of earthworks shall be observed in order to confine land clearance within the proposed new corridor of impact boundaries.
- Topsoil shall be stockpiled and used for reinstating flora along the road. It is assumed that displaced fauna will return once the work is over, or seek another habitat locally.
- The road design shall try as practicable to offset the route so as to avoid felling all big trees that take many years to grow or other flora of outstanding importance.

Disruption of Economic and Social Activities and Services

- Awareness rising to community within the project core area; and

- Inclusion of local leaders (Ward/sub-ward chairpersons/executive officers or /and councilors.
- Development of RAP as per RPF including livelihood restoration measures.

Damage to Cultural Heritage

- Implementation of the chance finds procedure as per the WB guides.
- Screening of potential construction sites to identify cultural heritage.
- Engagement with local leaders and communities to understand the location of locally important cultural heritage (as part of screening).

6.10.3 Mitigation Measures for Operational Phase Impacts

Increased Road Accidents

- Capacity building of district polices (traffic) offices
- Installation of proper road signs and regular inspections for their presence
- Installation of speed control devices like humps
- Installation of pedestrian lanes at human settlement crossings

Labour and Working Conditions

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

Community Safety – Social Conflict

- Maintain good security in the area with signage like “No employment at the moment”, to keep away job seeker to avoid unnecessary people in project sites
- Local workers will be hired to the extent possible to minimize influx
- Workers will be required to sign worker codes of conduct.
- Contractors will need as part of their C-ESMP to include camp management requirements
- Ongoing engagement with local stakeholders including relevant authorities on construction activities
- Ensure that all stakeholders are aware of the grievance redress mechanism and have access to the same.
- GBV Action Plan will be developed to prevent and respond to project related GBV risks associated with the community.
- The PIU will ensure that contractor (i) make reasonable inquiries to verify that the direct or contracted workers retained to provide security are not implicated in past abuses; (ii) train them adequately (or determine that they are properly trained) in the use of force, and appropriate conduct toward workers and affected communities; and (iii) require them to act within the applicable laws of Tanzania.

Community Health – Communicable Disease Transmission

- In order to prevent more HIV/AIDS infection, during the implementation phase, the project shall include information education and communication component (IEC) for workers and the community in its budget. This will help to raise more awareness on HIV/AIDS and means to suppress its incidence.
- The contractor shall deploy locally available labour as practically possible
- A safety, health and environment induction training shall be conducted to all workers, putting more emphasis on HIV/AIDS and communicable diseases.
- Staff shall be encouraged the use of preventive measures like condoms by availing condom dispensers.
- Contractors will be required as part of the ESMP to include measures to demonstrate how they will work in a Covid-19 secure manner where relevant to minimize transmission risks.
- Worksites will be well maintained to avoid the creation of breeding sites for vectors. This will include to avoid the construction of small pools of water (mosquitos), waste (rodents) etc. which contribute to diseases transmission (water will be stored in containers).
- Contractors will have access to potable water and adequate sanitation facilities to prevent disease transmission.

Community Health – Accidents and Injury

- Maintain good security in the area with signage like “No employment at the moment”, to keep away job seeker to avoid unnecessary people in project sites
- Develop and implement an emergency response plan including spill response and train workers on the same;

- Institute good site practices including prevent public access to the construction site by securing equipment and demarcate excavate, using warning signs with appropriate text (local language) and graphics programs;
- Institute traffic management and safety programme including, training and testing of heavy vehicles operators and drivers, enforcement of speed limits, maximum loading restrictions and compliance with all Tanzania transportation law and standards
- Undertake stakeholder engagement with local communities to inform them of activities on the site and associated risks.

CHAPTER SEVEN: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

7.1 Introduction

The Environmental and Social Management Plan (ESMP) presents the implementation schedule for the proposed mitigation measures to both environmental and social impacts as well as planning for long-term monitoring activities. The ESMP also includes the associated environmental costs needed to implement the recommended mitigation measures. The engineering designs have already included some of the mitigation measures recommended in this report. Additional recommendations provided in the ESMP to enable the proposed facilities become more environmentally friendly. The implementation steps will involve the Contractor, the Resident Engineer, some utilities provide such as KUWASA, TTCL and TANESCO, and the local communities at large. **Table 36** provides the ESMP for the proposed CBD roads and the storm water drain.

7.2 Environmental and Social Costs

The principal environmental and social cost includes the cost for implementing the mitigation measures proposed and that for carrying out monitoring of specific environmental and social parameters. These costs indicated in **Table 36**. 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 36: Environmental and Social Management Plan (ESMP) for the Proposed CBD Roads upgrade and the stormwater drain rehabilitation in Kahama Municipality

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs (in TSH)
Construction phase					
Destruction of other infrastructures	<p>-TANESCO, KUWASA and TTCL shall be involved from the early stages of these projects so as to have an integrated planning.</p> <p>-Early notice shall be given to the community before any service interruption</p> <p>-The funds for the relocation of this infrastructure shall be part and parcel of the project.</p>	Contractor/ Consultant / TANESCO/ KUWASA/ TTCL	Design and Construction		Provided in the BoQ (Series 1000)
Soil Erosion and instability of Slopes	<p>-Unnecessary ground clearance and sensitive re-alignments shall be avoided.</p> <p>-Lined drainage channels at sensitive terrains shall be provided to control speed and volumes of storm-water. The discharge points must be carefully chosen to avoid erosion of arable land and creation of gullies.</p> <p>-The contractor should Plant vertiver grasses to minimise exposed soil surface.</p> <p>-Proper grading to promote sheet flow and minimize flow concentration on unconsolidated soil.</p>	Contractor/ Consultant/ Env Supervisor	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 (in TSH)
	-Directing flow to properly designated channels.				
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	Contractor// Env. Supervisor	Construction	Provided in the BoQ (SS 1709)	
Air pollution	-Watering road section (near human habitation) -Proper choice of equipment which offer environmental advantages	Contractor/ Env. Supervisor	Construction	Provided in the BoQ (SS 1708)	
Vibration	-Advance notice to local communities	Contractor	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.	Contractor/ Env. Supervisor Local community	Construction Phase	Provided in the BoQ	
Increased Accidents	-Contractor shall prepare Traffic Management plan which shall be approved by the Engineer and the -A transport coordinator shall be appointed to control the movement of vehicles and equipment and he shall be responsible for safe and smooth deployment of fleet.	Design team/ Traffic Police/ Contractor	Design stage and Construction Phase		

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs (in TSH)
	<ul style="list-style-type: none"> -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 shall 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 				
Increased Waste	<ul style="list-style-type: none"> -Vegetations (Trees, Grasses) and remnants of timber shall be given to residents near the project roads to be used as Source of energy. -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. 	Contractor/ Supervisor	Env. Construction Phase	Provided in the BoQ (SS1712)	

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs (in TSH)
	<ul style="list-style-type: none"> -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	<ul style="list-style-type: none"> -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) 	Contractor/Consultant/ /Supervisor/	During Mobilization, Construction and after construction	Provided in the BoQ (SS 1703)	
Loss of Vegetation	<ul style="list-style-type: none"> -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 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. 	Contractor/ Supervisor / Contractor	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 (in TSH)
	-Trees and Crops to be removed shall be compensated				
Operation phase					
Interference to local hydrology	<ul style="list-style-type: none"> -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. 	Design engineer/	Design Stage	N/A	
Increased Road accidents	<ul style="list-style-type: none"> -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. -Capacity building of district polices (traffic) offices -Installation of proper road signs (in Swahili Language) and regular inspections for their presence -Installation of speed control devices like humps 	Design Engineer /Traffic police/	Operation phase		

Impact	Mitigation measure	Responsible institution/Individuals	Mitigation Time frame	Annual Costs	Lump sum (Onetime costs) Costs (in TSH)
	-Installation of pedestrian lanes at human settlement crossings				
Total Cost					125,000,000

7.3 Implementation Of the ESMP

To facilitate effective implementation of the EMPs, the Kahama Municipal Council Technical Support Team (TST) will:

- (a) establish an Environmental and Social Unit (ESU) responsible for ensuring the timely implementation of the EMP, 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 the ESU in performing these tasks.

Kahama 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. Kahama Municipal Council will provide the overall policy guidance and oversight for project implementation, including the EMP. More details on organization, roles and responsibilities for the EMP implementation and the monitoring program are described further below.

7.4 Role and Responsibilities for ESMP Implementation

Kahama Municipal Council through Technical Support Team (TST) shall be responsible for EMP implementation; the Project Coordinator (PC-Kahama Municipal Council) will have a quality assurance and monitoring role including all safeguards aspects. Kahama 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 EMP 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 EMP. 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 ESU/TST for implementing supervision and monitoring, and (ii) reporting on the implementation through periodic monitoring reports. The relationship, roles and responsibilities of the ESU, TST, CSC, and IEMC outlined in **Table 37**.

Table 37: Role and Responsibilities of Key Parties for EMP Implementation

Organ	Roles and Responsibilities
-TST/ ESUs	-Responsible for implementing the EMP during the detailed design and construction stages. EMP implementation during operation stage is the responsibility of the TST will set up an Environmental and Social Unit (ESU) to ensure timely and effective implementation of the EMP, including preparation of reports on safeguard compliance as required by Government and WB.
	– Responsible for ensuring that the relevant sections in the bidding and contract documents for all construction works are in compliance with the EMP; this means they contain the requirements of the ECOPs and site-specific EMPs.
	– Responsible for communicating with relevant local, regional and national departments; and with the agencies responsible for implementing and supervising EMP, 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 EMP, Kahama Municipal Council-TST/ESUs will hire national environmental consultants to assist them with carrying out and monitoring the EMP implementation.
	– In the course of supervising and monitoring the contractors' performance, -TST 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 EMPs; 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 (KUWASA), 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.

Organ	Roles and Responsibilities
	<ul style="list-style-type: none"> – Ensure that all work comply with the approved EMPs, 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. – Prepare action plans and/or propose urgent solutions to cope with environmental problems, emergency situations and damage that occurred during construction – Recommend to -TSTs 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	<p>Responsibilities with respect to all aspects of the works, including the environmental aspects, are set out in the contract documents, signed with the -TST.</p> <ul style="list-style-type: none"> – Construction contractors are responsible for carrying out environmental impact mitigation measures and for complying with the approved EMP when implementing construction contracts. When preparing the “Contractors EMP”, 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 EMP. – Contractor’s EMP will be submitted to -TST 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 -TST, CSC, BEMC, environmental authorities and the local community for their compliance with the EMP.

Organ	Roles and Responsibilities
Independent Environmental Monitoring Consultant (IEMC)	<p>The IEMC will be responsible for assisting the Kahama Municipal Council-TST with the EMP 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 Kahama Municipal Council-TST and World Bank supervision staff, the IEMC will be responsible for quarterly checking, and for supporting the Kahama Municipal Council-TST staff 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 Kahama Municipal Council-TST/ESU staff, including field engineers and/or consultants (CSC), in supervising the EMP implementation by the contractors; (2) ensuring active participation of the 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</p>
	<p>– Ensuring that the approved EMP and all other relevant project legal agreements related to environmental safeguards are fully applied and complied with during project implementation.</p>
	<p>– Assessing the effectiveness of mitigation measures which are applied by contractors and CSC during project implementation; providing proposals and recommendations to the Kahama Municipal Council-TSTs on improvements needed to meet the safeguard requirements.</p>
	<p>– Reporting periodically (every 3 months) to the Kahama Municipal Council-TSTs on actual EMP performance during project implementation.</p>
	<p>– Establishing standard procedures, methods and forms to assist the Kahama Municipal Council-TSTs and CSC to assess contractors' progress in implementing the required impact mitigation and monitoring measures.</p>
	<p>– Assisting the Kahama Municipal Council-TSTs' environmental staff to review and check that relevant environmental sections (based on the EMP) have been included in the bid packages and construction contract documents to ensure compliance with environmental policies and impact mitigation and monitoring requirements.</p>
	<p>– Measuring, taking samples and monitoring periodically the key environmental parameters, i.e. once every 3 months.</p>
	<p>– Assistance with the preparation of documents and implementation of training programs in environmental monitoring and supervision for contractors, CSC and relevant staff of the Kahama Municipal Council-TST (environmental staff and coordinators of contract packages).</p>
	<p>– Via Kahama Municipal Council-TST, discussing with relevant enterprises, as necessary, to find suitable solutions for unexpected risks relating to environmental sanitation.</p>

7.5 Institutional Arrangements and Reporting Procedures

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

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

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

The responsibility for mitigation monitoring during the operation phase will lie with the Environmental Section in Kahama Municipal Council. Kahama Municipal Council-TST 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

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

The technical assistance will include support to experts and training that will cover (i) general knowledge of safeguards requirements and project procedures, and (ii) important specific

knowledge in safeguard procedures and requirements for project staff, consultants, and national contractors. This will include, for example, assistance with the preparation of documents and implementation of training programs on environmental management and environmental monitoring for contractors and relevant staff of Kahama Municipal Council to do their tasks. It will also include assisting Kahama Municipal Council environmental and social staff with the review of contract documents to ensure compliance with the EMP. It will also provide general environmental guidance as requested by Kahama Municipal Council to enhance overall project implementation and performance. Given the nature, locations, and scale of construction, it is anticipated that the safeguard technical assistance support and training will be provided at least during the first 3 years of the project implementation.

7.7 Proposed Training Programs

The table below provides examples of the basic training programs for safeguards during project implementation. The training programs developed and delivered by the Technical Assistance team for the implementation of safeguards for the Kahama Municipal Council training. The Kahama Municipal Council trained staff with the support of the Technical Assistance team for the implementation of safeguards will provide the training to contractors and other entities concerned.

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

-Target groups for the training: Kahama Municipal Council Staff, Contractors and community representatives in the project area (**Table 38**).

-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 Kahama 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 38: Training Programs for Capacity Building in Environmental Supervision and Management

Target Group	Kahama Municipal Council Staff
Course Title	Environmental supervision, monitoring and reporting
Participants	Environmental staff and technical staff (Project Coordinator, 20 KAHAMA 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	Kahama Municipal Council with support of the Technical Assistance team for the implementation of safeguards.
Target Groups	Contractors, Sub-contractors, Wards Authorities, Community Representatives
Course Title	Implementation of mitigation measures
Participators	On-site construction management staff; environmental staff of contractors; ward/group authorities.
Training frequency	<ul style="list-style-type: none"> • 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	Kahama Municipal Council with support of the Technical Assistance team for the implementation of safeguards
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	<ul style="list-style-type: none"> -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 Kahama Municipal Council

CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MONITORING PLAN

8.1 Environmental and Social Monitoring

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

The Tanzanian 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 39**). The ESMP also assigns responsibilities for monitoring activities. However, the divisional/ward/village environmental committees and municipal environmental committee will participate in the long-term daily monitoring of the project road especially during operation.

8.2 Monitoring Parameters

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

-Pre construction stage – Monitoring of the parameters at this stage is meant to establish the baseline information of the target parameters in the project area.

-Construction stage- Monitoring at this stage meant to establish the pollution levels that arise from the construction activities.

-Operation stage- Monitoring at this stage meant to check on the impacts that might arise as the result of normal use of the infrastructure.

-Decommissioning- Decommissioning not anticipated in the near future. However, if this will happen, may entail change of use (functional changes) or demolition triggered by change of land use.

Table 39: Environmental and Social Monitoring Plan for the Proposed -CBD Road network and the storm water drain in Kahama 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	$\mu\text{g}/\text{m}^3$	<i>Micro Dust Pro</i>	<0.01	Contractor/ Env. Supervisor	5,000,000
Noise Baseline	Noise level	Once before the construction starts	At the start, Middle and end of all project roads	dBA	Noise Level Meter	<110	Contractor/ Env. Supervisor	4,000,000
Water Quality	Turbidity, COD, BOD, Ph, DO	Once before the construction starts (During rain season)	All points where the river cross project roads		APHA 2009	TZS 789:2003	Contractor/ Env. Supervisor	6,500,000
Construction stage								
Air pollution	Dust	Once Per Month	At the start, Middle and end of all project roads	$\mu\text{g}/\text{m}^3$	<i>Micro Dust Pro</i>	<0.01	Contractor/ Env. Supervisor	6,500,000

Parameters		Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (TSH)
Noise pollution	Noise level	Once Per Month	At the start, Middle and end of all project roads	dBA	Measurements	<110	Contractor/ Env. Supervisor	5,500,000
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	Contractor/ Env. Supervisor	7,000,000
Soil erosion	Soil erosion along the road	Once in three Months	Project roads	Level of erosions	Site inspection	–	Env. Supervisor/ Contractor/ KAHAMA MUNICIPAL COUNCIL Env. officer	6,000,000
Vegetation	Biomass	Once in three month for construction period	Trees along the road	-	Inspection	-	Env. Supervisor/ Contractor/ District Forests Officer	5,500,000

Parameters		Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (TSH)
Vibration	Vibration levels	Once per Month	Project road	No per time	Records	-	Contractor/ Env. Supervisor	5,000,000
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	-	Municipal Health officers/ Contractor	6,000,000
Employment opportunity	Percentage of local construction labourers	Three times a year	Project site	Number of local people employed in the project	Records, inquiries and observation	-	Municipal council/ Contractor/ PMO-RALG	N/A
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 injuries and illness statistics	-	Contractor/ PMO-RALG	5,000,000

Parameters		Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (TSH)
Dust Suppression	Water sprinkling	Everyday	Project site	Frequency of water sprinkling	Inquiries and observation	Minimum dust emission	Contractor/ Environmental Supervisor	5,500,000
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	Traffic police/ Municipal council	4,000,000
Total monitoring costs								71,500,000

8.3 Grievances Redress Procedures

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

8.4 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.

8.5 Principles

A functional GRM has to be established and/or strengthened at Kahama 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.

8.6 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 channeled 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 complainant is still not satisfied then they will be advised of their right to appeal to the next level as outlined above. If the grievances cannot be resolved at the Kahama Municipal Council project implementing level or PCU at PO-RALG, 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 Kahama 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.

9.2 Benefits Related to the Project

The proposed project is expected to have the following benefits;

- Improved Transport in Kahama Municipal Council
- Reduced traffic congestion
- Increase property value

9.3 Costs Related to the Project

The construction of the project estimated to cost Tanzania Shillings around **8.05 billion**. The estimated costs for implementing impact management as well as monitoring process as outlined earlier is **125,000,000TSH** and **71,500,000TSH** respectively. Since some of the impacts will only to 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 funded by United Republic of Tanzania under Ministry of Works.

CHAPTER TEN: DECOMMISSIONING

10.1 Introduction

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

10.2 Detailed Decommissioning Plan

This Section provides a brief outline of the works required to demolish the Proposed infrastructures on the site incase it happen. This Plan will be used as a reference document that provides the framework to ensure that demolition activities on the site do not adversely affect the health, safety, traffic or the environment of the public and neighbouring properties. The Contractor will be required to prepare a detailed Demolition Plan and Construction Management Plan to the satisfaction of the Proponent and relevant Authorities prior to the commencement of works on site.

10.3 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.

10.4 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 Kahama Municipal Council and District Councils which outlines the objectives of:

- maximisation, reuse and recycling of demolition material
- minimisation of waste disposal
- evidence of implementation for specified arrangements of waste management

On-site storage of reusable materials will occur at Site. Recycling and disposal containers will also be accommodated at this location for collection vehicles. Hazardous materials will be treated separately. A hazardous materials inspection will be undertaken by an accredited

consultant and a report issued. Hazardous materials will be removed in accordance with EMA 2004. A final clearance report will be provided by the hygienist which will include the provision of tip dockets from waste centres.

10.4 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

10.5 Protective Measures

An A Class hoarding will be erected around the perimeter of the construction site prior to the commencement of demolition works. Additionally, wherever the risk arises of material falling into public areas, overhead protection will be provided in the form of a B Class hoarding. Scaffolding will be erected to facades where materials could fall in excess of 4m. The scaffolding will be clad with chainwire and shade cloth to enclose debris and dust onto the site. During the demolition, dust control measures will be used to minimise the spread of dust from site. The Contractor will have a senior representative on site at all times to ensure compliance with the safety guidelines and agreed work methods.

10.5.1 Traffic Management

The management of construction traffic during the decommissioning phase will be subject to the provision of a detailed traffic management plan. This plan will be prepared by the Contractor for the various stages of demolition. During demolition, all traffic will be held within the site boundaries. The site will remain closed to pedestrian traffic and will be generally manned by security.

10.5.2 Occupational Health and Safety

A detailed OH&S Policy will be provided by the Contractor prior to work commencement. A detailed Site Safety Plan will be prepared for the specific project.

10.5.3 Environmental Management Plan

A detailed Environmental Management Plan will be provided by the Contractor prior to the commencement of the work.

10.6 Potential Impacts And Mitigation Measures

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 a the authorized dumpsite

Costs for Undertaking the Mitigation Measures

The cost for undertaking Mitigation measures during decommisioning is estimated to be 50,000,000TSH.

10.7 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 AND CONCLUSION

11.1 Summary and Conclusion

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 Kahama District Council. The associated negative impacts, to a large extent have been minimized through good engineering design and envisaged construction practices. Specific mitigation measures have been suggested in this report to offset some of the inherent adverse impacts. Implementing these mitigation measures would increase environmental soundness of the project road.

The abandonment of the Project works and site reclamation for the quarries and borrow pits will be undertaken at or before the close of the Project. The works will be integrated into the overall. Project Abandonment and Reclamation Plan, although separate closure plans for each quarry and borrow pit will be required. Closure of the Project will involve removing construction materials, equipment and infrastructure and reclaiming the site to self sustaining productive ecosystem near its original condition.

It is, therefore, concluded that, implementation of the proposed project will entail no detrimental impacts provided that the recommended mitigation measures are adequately and timely put in place. The identified adverse impacts shall be managed through the proposed mitigation measures and implementation regime laid down in this EIS. Kahama Municipal Council is committed to implementing all the recommendations given in the EIS and further carrying out the environmental auditing and monitoring schedules.

11.2 Recommendations

- Kahama Municipal Council should allow the construction of CBD roads and the storm water drain because it has no detrimental impacts to environment or Social once mitigation measures proposed are to be implemented.
- Kahama Municipal Council must abide to the Mitigation measures to combat impacts Identified in this report.
- Contractor must abide safety and health mitigation measures during construction as well addressed in mitigation measures

BIBLIOGRAPY

Shinyanga Investment Profile (2013)

United Republic of Tanzania (2005), EIA and Audit Regulations

United Republic of Tanzania (2003), National Transport Policy, Dar es Salaam, Tanzania.

United Republic of Tanzania (2001), National Policy on HIV/AIDS, Dar es Salaam, Tanzania.

United Republic of Tanzania (2007), The Road Act, Dar es Salaam, Tanzania.

United Republic of Tanzania (2009), The Standards Act No. 2, Dar es Salaam, Tanzania.

United Republic of Tanzania (1997), Regional and District Act No 9, Dar es Salaam, Tanzania.

United Republic of Tanzania (1967), The Land Acquisition Act, Dar es Salaam, Tanzania.

United Republic of Tanzania (2008), The HIV and AIDS (Prevention and Control) Act, Dar es Salaam, Tanzania.

United Republic of Tanzania (2001), Land (Assessment of the Value of Land for Compensation) Regulations, Dar es Salaam, Tanzania.

United Republic of Tanzania (1997). National Environmental Policy (1997), Dar es Salaam, Tanzania.

United Republic of Tanzania (2003). Construction Industry Policy (2003), Dar es Salaam, Tanzania.

United Republic of Tanzania (1995). Land Policy (1995) , Dar es Salaam, Tanzania.

United Republic of Tanzania (2000). National Human Settlements Development Policy (2000), Dar es Salaam, Tanzania.

United Republic of Tanzania (2002). National Gender Policy (2002), Dar es Salaam, Tanzania.

United Republic of Tanzania (1992). Energy Policy (1992), Dar es Salaam, Tanzania.

United Republic of Tanzania (2004). Environmental Management Act No. 20 (2004), Cap. 191, Dar es Salaam, Tanzania.

United Republic of Tanzania (2009). Water Supply and Sanitation Act No. 12 (2009), Dar es Salaam, Tanzania.

United Republic of Tanzania (2007). The Land Act, 1999. The Urban Planning Act (2007), Dar es Salaam, Tanzania.

United Republic of Tanzania (2003). Occupational Health and Safety (2003), Dar es Salaam, Tanzania.

United Republic of Tanzania (2004). Employment and Labour Relations Act No. 6 (2004), Dar es Salaam, Tanzania.

United Republic of Tanzania (2004). Employment and Labour Relations Act No. 6 (2004), Dar es Salaam, Tanzania.

United Republic of Tanzania (2007). Engineers Registration Act and its Amendments 1997, Dar es Salaam, Tanzania.

United Republic of Tanzania (1997). The Contractors Registration Act (1997), Dar es Salaam, Tanzania.

United Republic of Tanzania (1997). The Architects and Quantity Surveyors Act (1997), Dar es Salaam, Tanzania.

United Republic of Tanzania (2009). Public Health Act (2009), Dar es Salaam, Tanzania.

United Republic of Tanzania (2000). The Tanzania Development Vision (2000), Dar es Salaam, Tanzania.

United Republic of Tanzania (2005). Impact Assessment and Auditing Regulations (2005), Dar es Salaam, Tanzania.

APPENDICES

Appendix I: Terms of References

Environmental and Social Impact Assessment for the Proposed Upgrading of 10.6km Access Roads at the Central Business District and the Rehabilitation of 3km Storm Water Drains in Kahama Municipality, Shinyanga 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 construction of CBD roads and the storm water drain in Kahama Municipal Council. 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, equipments and chemicals required by the project. Source and quantities of water, energy, manpower (Staffing and support) and other facilities and services required in each phase of project life cycle;

[Note: specify any other type of information relevant to the description of the project category.]

Sub-Task (iii): Provide Baseline Condition or Description of the Environment

In order to forecast the impacts, it will be necessary to determine the initial reference or baseline state. It is therefore, required to describe the existing environment that would be directly and/or indirectly affected by the construction of the proposed road project. The 'environment' to be affected must be based on the broad definition of the term that would include biophysical, socio-economic, cultural and historical factors. Only those environmental factors that are necessary to understand the impacts of the planned development should be considered. Assemble, evaluate, and present baseline data on the relevant environmental characteristics of the study area. Include information on any changes anticipated before the project commences.

(a) Physical environment: This shall cover geology; topography; soils; climate and meteorology; ambient air quality; surface and groundwater hydrology; existing sources of air emissions; existing water pollution discharges; and receiving water quality;

(b) Biological environment: flora; fauna; rare or endangered species; ecologically Important or sensitive habitats, including Game and Forest reserves, significant natural sites; species of commercial importance; and species with potential to become nuisances, vectors, or dangerous (of project site and potential area of influence of the project); and Socio-cultural environment: population; land use; planned development activities; Community structure; employment; distribution of income, goods and services; recreation; public health; Gender issues and HIV/AIDS, cultural / historic properties; tribal peoples; and customs, aspirations, and attitudes to the project.

The consultant shall indicate sources of data and methodologies used to acquire data. The relevant international and national standards of noise levels, water and air quality etc. applied when comparing between the existing and anticipated impact of project.

Sub-Task (iv): Describe Legal, Policies and Administration Framework

Describe the policy, legal, institutional framework as well as Regulations, strategies, standards, international conventions and treaties that are of relevance to the environmental management and the proposed undertaking in particular. They should be those, which relate to but not limited to environmental quality, health and safety, protection of sensitive areas and protection of endangered species. The objective of this section is to show compliance of the developer with the existing policies, laws administrative/institutional conditions both at national and international levels.

The following, but not limited to, are the relevant policies and legislation to be cited in relation to the proposed project undertakings.

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)

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;

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.

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:

- Ministry of Works;
- Ministry of Water
- Kahama Municipal Council
- Ministry of Lands and Human Settlement Development
- Ministry of Energy and Minerals
- Local Governments in the project area;
- National Environment Management Council;
- Division of Environment -Vice President's Office; and
- Local Communities
- TANESCO and TTCL
- Regional Authorities

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 analyze cumulative, residue and trans-boundary impacts. Wherever possible, describe impacts quantitatively, in terms of environmental components affected (area, number), environmental costs and benefits. Assign economic values when feasible. Characterize the extent and quality of available data, explaining significant information deficiencies and any uncertainties associated with the predicted impacts. The Consultant should take into consideration existing by-laws, national and international environmental standards, legislation, treaties, and conventions that may affect the significance of identified impacts. The Consultant shall use the most up to date data and methods of analysing and assessing environmental and social impacts. Uncertainties concerning any impact indicated. The Consultant shall conduct a review of gender issues in the project area, the study shall include the road section influence to the lives of men, the elderly, women, children, and disabled so as to come up with a quantifiable analysis of the benefits which will accrue to them during and after the road construction.

Sub-Task (viii): Propose Impact Mitigation Measures

The Consultant shall suggest cost-effective measures for minimizing or eliminating adverse impacts of the proposed road works. Measures for enhancing positive or beneficial impacts recommended. The costs of implementing these measures shall wherever possible estimated and presented.

One of the mitigation measures for the resettlement impact is compensation. The consultant is therefore required to conduct properties valuation for those properties to affected by the project implementation to effect compensation. The Consultant shall review the ongoing measures on HIV/AIDS awareness creation within the project area and propose for the mitigation measures. The proposal shall include a plan of action, which will identify responsible key implementers, period and expected output.

The proposed mitigation measures and cost estimate shall be grouped in a separate Bills of Quantities (BOQ) for the project and include cost of supervision for the implementation of mitigation measures.

Sub-Task (ix): Resource Evaluation or Cost Benefit Analysis.

The Consultant shall undertake qualitative and quantitative analysis of costs and benefits to determine the viability of the proposed project on the environment, social and economic aspects. The Economic Internal Rate of Return (EIRR) and Net Present Value (NPV) of the project at recommended discount rate of 12% should be calculated and provide interpretation of the results.

Sub-Task (x): Environmental and Social Management Plan (EMP)

The Environmental Management Plan focuses on three generic areas: implementation of mitigation measures, institutional strengthening and training, and monitoring. The Consultant shall prepare Environmental and Social Management Plan, which will include proposed work programme, budget estimates, schedules, staffing and training requirements and other necessary support services to implement the mitigation measures. Institutional arrangements required for implementing this management plan indicated. The cost of implementing the monitoring and evaluation including staffing, training and institutional arrangements specified. Where monitoring and evaluation will require inter-agency collaboration, this indicated.

Identify institutional needs to implement environmental assessment recommendations. Review the authority and capability of institutions at local, regional, and national levels and recommend how to strengthen the capacity to implement the environmental management and monitoring plans. The recommendations may cover such diverse topics as new laws and regulations, new agencies or agency functions, inter-sectoral arrangements, management procedures and training, staffing, operation and maintenance training, budgeting, and financial support.

EMP should specify impact mitigation plan and environmental monitoring plan requirement. Inject costs, responsibility and timeframe for mitigating each impact and monitoring of each environmental parameter. Impact Mitigation plan and monitoring plan should be based on the project phases i.e. mobilization or Pre-construction, Construction, Operation, Demobilization and Decommissioning phase. Prepare Resettlement Action Plan (RAP) to be implemented in accordance with the National Land Act No 4 and 5 of 1999 (revised in 2004). All properties likely to be affected by the road project should be evaluated for compensation arrangements.

TASK 3.4: REPORTING

Notwithstanding the above requirements, the contents and the structure of the Environmental and social Impact Assessment Report should be in accordance with the Environmental Impact Assessment and Audit Regulations of 2005: It is recommended that the Environmental Impact Assessment report closely contain the followings:

- The Report shall be presented as per format stipulated in Regulation 18 (2);
- The Executive Summary of the report should reflect the Regulation 18 (3) requirements;
- The Non-Technical Executive Summary should be a brief stand-alone document both in Kiswahili and English languages starting with the main findings, conclusions and recommendations as required by Regulation 19 (2).
- The cover page to indicate the names and address of the Client, 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/2022/3207

Date: 10/06/2022

KAHAMA MUNICIPAL COUNCIL,
P.O. BOX 472,
KAHAMA

**RE: APPROVAL OF TERMS OF REFERENCE (ToR) FOR THE PROPOSED
IMPROVEMENT OF ROADS AT THE CENTRAL BUSINESS DISTRICT AND
THE CONSTRUCTION OF STORM WATER DRAIN AT KAHAMA MUNICIPAL
COUNCIL, SHINYANGA 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 Environmental and Social Impact Assessment (ESIA) study 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 neighbours and the Local Government Authorities. Their views and concerns should be addressed. Records of meetings, communication and comments should be provided with proof of service. Consultation forms should bear **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. Only registered environmental experts should appear on the cover page of the ESIA report.

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: Rosemary Cliford Nyirenda
P. O. Box 68376,
DAR ES SALAAM

All correspondence should be addressed to the Director General

Appendix III: List Of Stakeholders Consulted

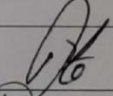
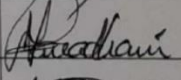
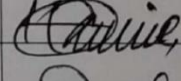
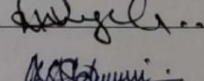
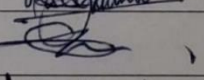
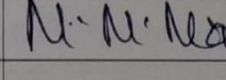
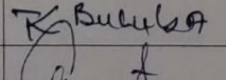
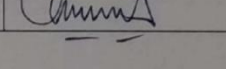
**ORODHA YA WADAU WALIOSHIRIKI KATIKA MAJADILIANO KUHUSU UJENZI WA STENDI YA BASI ILIYOPO
MBULU WILAYANI KAHAMA**

**STAKEHOLDERS CONSULTATION FOR THE PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT
ASSESSMENT, STAKEHOLDER ENGAGEMENT PLAN, RESETTLEMENT ACTION PLAN AND DESIGN DRAWINGS
OF THE PROPOSED CONSTRUCTION OF BUS TERMINAL AT MBULAIN KAHAMA TOWN COUNCIL**

TAREHE NA MUDA / DATE AND TIME: 11:40am SIKU/DAY: 12/01/2022

PARTICIPANTS LIST

KAHAMA MJINI / STAND

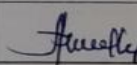

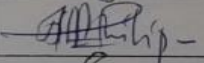
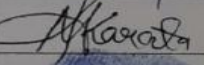

No	Jina / Name	Namba ya Simu / Tel. Number	Anuaniyabarua pepe / Email Address	Sahihi / Signature
1	KWELWA RT2	0767398906	KwelaRobert@yahoo.com	
2	YAHYA BAKKIDHANI BUKALA	0755505357	yahyaBakidala@gmail.com	
3	Hamidu Juma	0754650998	Idlwani 12/ mjiini	
4	Hamisi Luvogera	076960782	m/kiti KAHAMA MJIINI	
5	MATHIAS MUSUNGWI	0754697460	KATIBU UWAVISKA	
6	GRAYSON L. CHAMI	0713-123253	MJUMBE UWAVISKA	
7	MCHURU MALAKI MHAHO	0767063634	MFANYA BIASHARA	N. N. Ndolele
8	KISELYA BULUBA	0756800180	MFANYA BIASHARA	
9	Clemens C. LUSHONN	0754-467430	AGENI WA BASI	

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

**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 KAHAMA TOWN COUNCIL**

TAREHE NA MUDA / DATE AND TIME: 9:00 am - 3pm SIKU/DAY: 13/01/2022 Thursday

PARTICIPANTS LIST

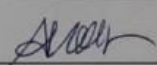



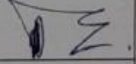
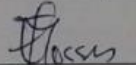
No	Jina / Name	Cheo / Position	Namba ya Simu / Tel. Number	Anuaniyabarua pepe / Email Address	Sahihi / Signature
01	Ed-John RA KUTASTAPA	District Engineer Tengeru	0786-211592	ed.john.kahama@teng.co.tz	
02	Said Hamuel	Ag. District OP. Engineer TANGU	0767-202257	said.hamuel@tenco.co.tz	
03	Joseph John	Ag. PCE - KAHAMA T.M.	0754-742025	josephatjohn2@gmail.com	
04	Mbwana Karata	Makamu M/Kiti CHAWATA	0764685253	mbwanakarata@gmail.com	
05	Marco Nkanjiwa	Mwenyekiti SHIRIYAWATA	0755047015	shiriyawatakahama@gmail.com	

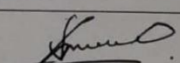
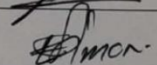
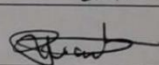
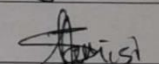
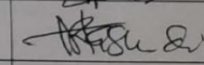
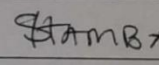
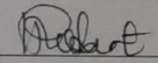
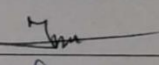
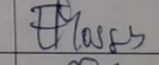
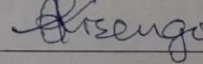
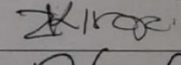
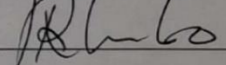
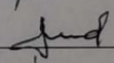
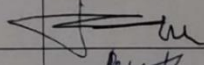
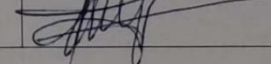
**ORODHA YA WADAU WALIOSHIRIKI KATIKA MAJADILIANO KUHUSU UJENZI NA UBORESHAJI WA
MIUNDOMBINU WILAYANI KAHAMA**

**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 KAHAMA TOWN COUNCIL**

TAREHE NA MUDA / DATE AND TIME: 7:20 - 8:00 am SIKU/DAY: 13/01/2022

PARTICIPANTS LIST

No	Jina / Name	Cheo / Position	Namba ya Simu / Tel. Number	Anuaniyabarua pepe / Email Address	Sahihi / Signature
1.	Anderson David Msumba	Municipal Director	074272727		
2	Clemence -B. Mkusa	MUPO	0762062282	kabovemkusa@yahoo.co.uk	
3	ROBERT KWELA	MEDO	0767398906	kwebrobert@yahoo.co.uk	
4	IBRAHIM KUGURU	AS mmo	0764663572	kugurinharm@gmail.com	
5.	FLORA K. SANGIWA	MUPO	0755002364	fsangiwa@yahoo.com	
6.	Enne Moses	Arch	0714204255	yvonnemoses@gmail.com	

10	NALUM NALO NAIL	0752920370	—	
11	ELIKANA CHARLES	0763795824	STAND KUU	
12	JUMA JOSEPH	0685950017	STAND KUU	
13	SHARIFE H. KAHAGILA	0764145730	STAND KUU	
14	HABIBO R. HASSANI	0758012804	STAND KUU	
15	SALIMA M MIBAKO	0742-582868	STAND KUU	
16	HILDA ROBERT	0757435941	KMC	
17	JOHANNES E. MWIBESA	0755017196	STANDI YAMUBESI KUU	
18	ENNE MOSES	0714204255	KMC	
19	CHRISPIN A KISENGO	0762355574	erizok10@gmail.com	
20	ZENA HASSANI	0765768354		
21	ROMARIUS NYEMBO	0763-417039	mkhi machms	
22	BERNARD J. KIUMA	0763194139	KHM	
23	PAULO-SAMUEL	0763887274	KHM	
24	AZIZ ALI	0763250782	KHM	



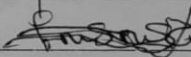
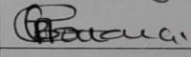
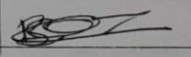
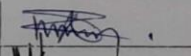
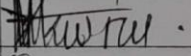
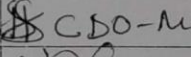
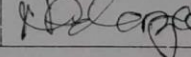
ORODHA YA WADAU WALIOSHIRIKI KATIKA MAJADILIANO KUHUSU UJENZI WA BARABARA NA MITARO
WILAYANI KAHAMA

STAKEHOLDERS CONSULTATION FOR THE PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT
ASSESSMENT, STAKEHOLDER ENGAGEMENT PLAN, RESETTLEMENT ACTION PLAN AND DESIGN DRAWINGS
OF THE PROPOSED CONSTRUCTION OF ROADS AND STORM WATER DRAINAGE IN KAHAMA TOWN COUNCIL

TAREHE NA MUDA / DATE AND TIME: 13th / 01 / 2022 SIKU/DAY: Thursday

PARTICIPANTS LIST

MALUNGA WARD

No	Jina / Name	Namba ya Simu / Tel. Number	Anuaniyabarua pepe / Email Address	Sahihi / Signature
1	MIPANDA ALBERT	0683511189	mipandaalbert@gmail.com	 MIPANDA ALBERT - KATA MALUNGA
2	CHRISTINA S. MAREGESE	0763039081	G.L.P 472, KAHAMA	 WEO - MALUNGA
3	FATUMA M. RASHIDI	0763-086072	— u —	 MAREGESE - KATA MALUNGA
4	GRACE N. BOTANA	0755-152008	— u —	 MAREGESE - KATA MALUNGA
5	BEATRICE P. SHIRIMA	0767 142028	— u —	 MAREGESE - KATA MALUNGA
6	BENARD MAHONGO	0767 437526	— u —	 MAREGESE - KATA MALUNGA
7	YASINI H. MIKUTZU	0756-947783	— 1 —	 MAREGESE - KATA MALUNGA
8	DOTTO D. MAGILIE	0752485891	dotto.daniel072@gmail.com	 MAREGESE - KATA MALUNGA
9	Patroba Privates	0767 980322	Mikubwa Intae-solera	 MAREGESE - KATA MALUNGA

ORODHA YA WADAU WALIOSHIRIKI KATIKA MAJADILIANO KUHUSU UJENZI WA BARABARA NA MITARO
WILAYANI KAHAMA

STAKEHOLDERS CONSULTATION FOR THE PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT
ASSESSMENT, STAKEHOLDER ENGAGEMENT PLAN, RESETTLEMENT ACTION PLAN AND DESIGN DRAWINGS
OF THE PROPOSED CONSTRUCTION OF ROADS AND STORM WATER DRAINAGE IN KAHAMA TOWN COUNCIL

TAREHE NA MUDA / DATE AND TIME: 13th / 01 / 2022 SIKU/DAY: Thursday

PARTICIPANTS LIST

No	Jina / Name	Namba ya Simu / Tel. Number	Anuaniyabarua pepe / Email Address	Sahihi / Signature	Wadhifa
10	SEBASTIAN S. MASONGA	0759-470048	—	S. K/CCM	KATIKA MBE
11	NORR M. NISEVEN	0754442904	—	M. N/Kiti'cem	—
12	JACKSON K. ZABRON	0766033326	—	—	MEO - sokola
13	ABDALLAH HAMAD	0682180300	—	—	MJUMBE - sokola
14	MICHAEL M. MIZUBO	0754436632	—	—	MTHONGOLO
15	BONIFACE KIMBA	0744122785	—	—	WED MTHONGOLO
16	AHAMZA ABDALLAH	0754048054	—	—	MIKITI MTHONGOLO
17	EMMANUEL NANGALE	0683130374	—	—	M/KITI MTHONGOLO
18	AMCHA K. ADAMU	0692011380	—	—	M. ADAMU MJUMBE SOKOLA

MAJENGO & MHO NGOLO				
19.	RUGANGILA VEDASTU	0787578737	rugangilavedastu@gmail.com	Mjumba AEK-MHONGOLO Mjumba
20	JAMILA KACHEKE	0754583367	—	Mjumba Serikali ya mtaa Sokola Kigila
21	LAUREN NAWABI	0755368022	—	BARAZA LA WAZEE la
22	MASONA CLEMEN	0755322584	—	MWAKILISHI NZENGO la
23	DAMAS JIKATYUKA	0768201127	—	MEO MTAU WA MHONGOLO Solus
24	ANDREW JILARI	0762-515199	Andrew611@gmail.com	MKAZI (MWAKILISHI) NZENGO lalet
25	RAHMA MAHMMED	0765074736	Balazrahma78@gmail.com	AJWA AFYA MAZIMARA R.Mohamed
26	ANANIA Z. MILIGO	0768795178	—	Mjumba Serikali majengo Ammer
27	SALUM RAJABI SALUM	0785-017006	—	MJUMBE WA NZENGO Ammer

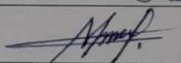
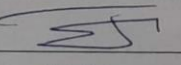
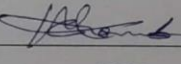
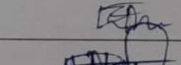
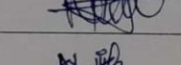
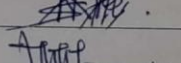
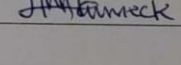
ORODHA YA WADAU WALIOSHIRIKI KATIKA MAJADILIANO KUHUSU UJENZI WA BARABARA NA MITARO
WILAYANI ~~KAHAMA~~ KAHAMA

STAKEHOLDERS CONSULTATION FOR THE PREPARATION OF ENVIRONMENTAL AND SOCIAL IMPACT
ASSESSMENT, STAKEHOLDER ENGAGEMENT PLAN, RESETTLEMENT ACTION PLAN AND DESIGN DRAWINGS
OF THE PROPOSED CONSTRUCTION OF ROADS AND STORM WATER DRAINAGE IN KAHAMA TOWN COUNCIL

TAREHE NA MUDA / DATE AND TIME: 13/01/2022 SIKU/DAY: Thursday

PARTICIPANTS LIST

NYIHOGA WARD

No	Jina / Name	Namba ya Simu / Tel. Number	Anuaniyabarua pepe / Email Address	Sahihi / Signature
1	SINDANO W. MATHUM	0762612272	889 KAHAMA	DWANI OHS
2	COSMAS M. BUKANGO	0752297000	472-KAHAMA-WED	
3	JOSEPH D. NGOWELA	0759499299	472-KAHAMA-MIKITI	FERUS
4	ADY S. MITIMIRI	0755443780	472-KAHAMA-MIKITI	
5	CYRIL M. NOMBOMBO	0784-285128	472-KAHAMA-WALED	
6	ESTHER Z. MATIONGE	0759499896	- -	
07	MARY RAMADHAN JOHN	0672702521		
8	NOEL A. SUKWA	0748279855		
9	Michael Lameck	0757623945	- -	

				NYIHOGO
10	ELIZABETH P JOHN	0769 6649 85	- - -	E. PETRO
11	Gloria INOCENT	0765 3696 76		
12	ASMINI TOBA	0747 4875 35		
13	Ramadhan Hamis Majid	0784-637787	- - -	Ramdis
14	Beatrice S. Mngazys	0755925595	AEK-NYIHOGO Box 472 KHAM	
15	EWICE EPAPHLA	0744860051	mjumbE	
16	MARIAM J. LUSAGALIKA	0755362048	ME0	
17	CHARLES KASHINJE	0753345528	WAMURA	
18	EMMANUEL SEMBANA	0756328705	mjumbE / mTHA	
19	ANTONY COASIN	0754813312	ME0	
20	SUMANE MALAMU	0745931818	mTHA mmbE	

Appendix IV: 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 provided 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 heat 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 heat 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 sunglasses/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 caused 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 aids with proper training to use them.
- 85 dB (A) – Signposts shall be erected to inform all employees and public that usage of ear 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 Kahama Municipal Council (KMC) 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 vehicle 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 contract 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 earthing 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 from 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.
- Signaller 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 and 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 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 from 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 one 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 75° 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 it 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, tires, 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.

Appendix V: Hydrology Study Report

1 Road Drainage Systems and Flood Protection

This section presents the suggested system to protect the roads at Kahama central business district (CBD) 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 1921 to 1993, (73 years) at Kahama station have been collected from SIEREM (2021). The data is given in **Table 1**.

Table 1: Kahama station AM daily data from SIEREM

Year	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
Depth (mm)	22	43	63	37	73	115	71	49	44	72
Year	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
Depth (mm)	58	44	67	62	65	57	51	33	59	58
Year	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950
Depth (mm)	83	165	60	97	57	54	127	67	90	99
Year	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Depth (mm)	80	89	83	64	75	39	66	84	54	86
Year	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Depth (mm)	77	92	79	191	62	72	60	113	40	134
Year	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Depth (mm)	192	292	39	54	49	53	68	90	91	75
Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Depth (mm)	111	55	39	48	54	80	52	79	61	58
Year	1991	1992	1993	-	-	-	-	-	-	-
Depth (mm)	65	52	53	-	-	-	-	-	-	-

Frequency analysis was conducted on the dataset using the Hyfran software. The performance of different distributions is given in **Table 2**, where it is evident that the GEV distribution is the most suitable distribution. The fit is shown in **Figure 1**.

Table 2: Performance of statistical distributions1, Kahama station

Distribution	Np	X_{100}	$P(M_i)$	$P(M_i x)$	BIC	AIC
GEV	3	206.8	20	55.5	704.2	697.3
Lognormal	2	181.9	20	34.8	705.1	700.6
Gumbel	2	167.8	20	9.6	707.7	703.1
Gamma	2	172.1	20	0.1	716.2	711.6
Exponential	2	269.8	20	0.0	736.9	732.3

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.

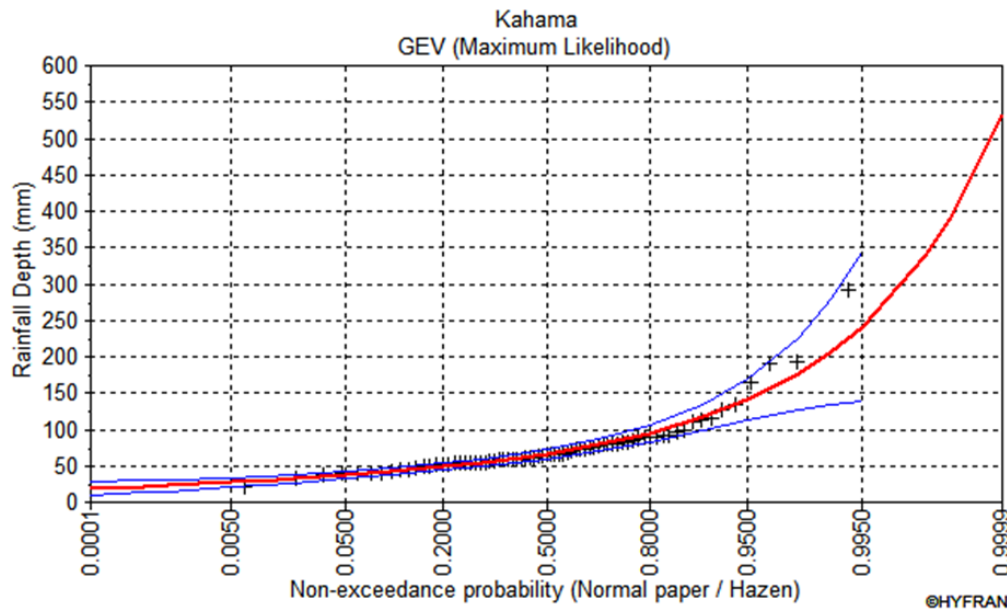


Figure1: The GEV distribution fit to Kahama AM daily rainfall data

The results of frequency analysis for different return periods are given in **Table 3**. 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.

Table 3: Design 24-hour rainfall depth for Kahama

T (year)	2	5	10	25	50	100	200
Depth (mm)	74.8	106.9	132.2	168.4	198.9	233.9	272.3

1.1.2 Intensity Duration Frequency curves

Annual Maximum (AM) daily data from 1921 to 1993, (73 years) at Kahama station have been collected from SIEREM (2021) Using the frequency analysis results the DDF values as well as the IDF values can be calculated as shown in **Table 4** and **5**. The resulting IDF curves are shown in **Figure 3**.

Table 4: Depth-Duration-Frequency (DDF) values for Kahama

T (years)	Rainfall Depth (mm) for Duration (minutes)										
	5	10	15	20	30	60	120	180	360	720	1440
2	14.0	23.4	30.2	35.3	42.5	53.7	62.0	65.6	69.9	72.8	74.8
5	18.4	30.9	40.0	46.9	56.8	72.4	84.6	90.1	97.3	103	107
10	22.8	38.3	49.5	58.0	70.3	89.5	105	111	120	127	132
25	29.0	48.7	63.0	73.9	89.5	114	133	142	153	162	168
50	34.3	57.5	74.4	87.3	106	135	157	168	181	191	199
100	40.3	67.7	87.5	103	124	158	185	197	213	225	234

Table 5: Intensity-Duration-Frequency (IDF) values for Kahama

T (years)	Rainfall Intensity (mm/hour) for Duration (minutes)										
	5	10	15	20	30	60	120	180	360	720	1440
2	168	140	121	106	85.1	53.7	31.0	21.9	11.7	6.07	3.12
5	221	186	160	141	114	72.4	42.3	30.0	16.2	8.55	4.45
10	273	230	198	174	141	89.5	52.3	37.1	20.1	10.6	5.51

25	348	292	252	222	179	114	66.6	47.3	25.5	13.5	7.02
50	411	345	298	262	211	135	78.7	55.9	30.2	15.9	8.29
100	484	406	350	308	249	158	92.5	65.7	35.5	18.7	9.75

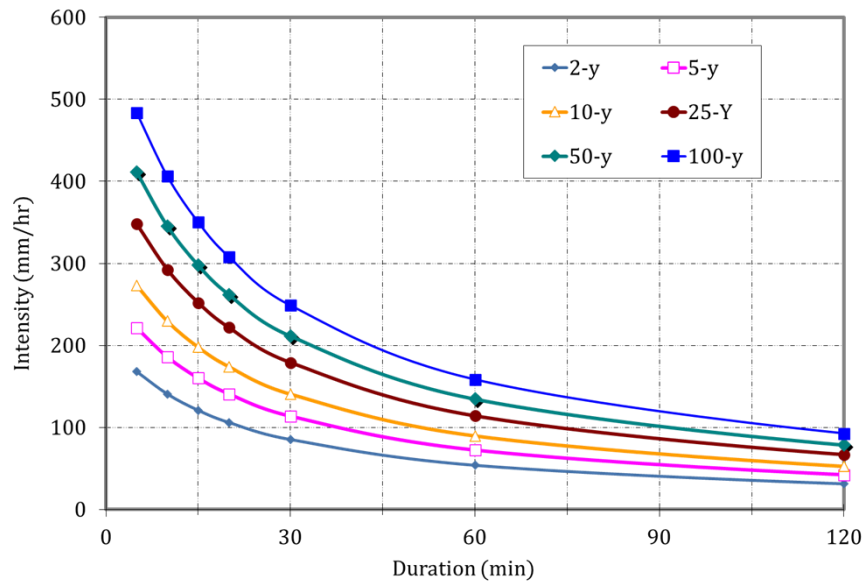


Figure 2: Intensity-Duration-Frequency (IDF) curves for Kahama.

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. 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 (m³/s).

C: Runoff coefficient.

A: Catchment area (km²).

I: Rainfall intensity corresponding to the catchment time of concentration (T_c)(mm/hr).

The runoff coefficient (C) reflecting the percentage of water flowing on saturated soil will be estimated using **Table 6**.

Table 6: runoff coefficient (C) reflecting the percentage of water flowing on saturated soil

Type of Drainage Area	Runoff Coefficient, <i>C</i>
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 7** below illustrates the type of data required by the model.

Table 7: 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 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 AMCI 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):

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

Where X_T is the design value at return period T , \bar{X} and S are the mean and standard deviation of the variable X , and K_T is the frequency factor, which depends on the return period T and the distribution type. It is very clear from the above equation that the design values are directly affected by the changes mean as well as the standard deviation of the data.

Climate change effect is studied at the location of Kahama, which has the most reliable official observations, which are key to bias correction as indicated above. Due to the proximity of the three locations, the effects of climate change at Kahama and Geita are expected to be similar to those at Mwanza. **Figure 3** shows the boxplot of percentage change in the mean of the annual maximum daily rainfall from different models. The median value of the change is an increase of 11.5% in the mean of annual maximum daily rainfall.

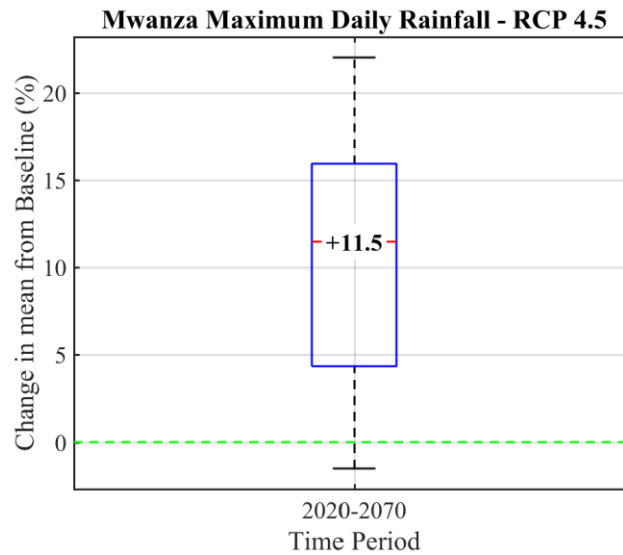


Figure 3: Projected percentage change in the mean of annual maximum daily rainfall.

On the other hand, **Figure 4** shows the boxplot of percentage change in the standard deviation of the annual maximum daily rainfall. The median value of the change is an increase of 19.2% in the standard deviation of annual maximum daily rainfall.

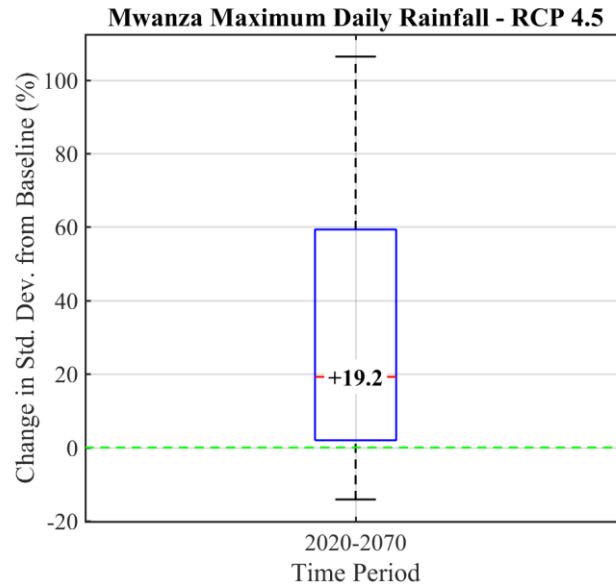


Figure 4: Projected percentage change in the standard deviation of annual maximum daily rainfall

Based on the above projected changes in mean and standard deviation, the results of frequency analysis are adjusted for future changes by applying the changes in mean and standard deviations. The adjusted values are given in **Table 8**. Based on these results, an increase in the order of 15% on average in design depths is to be adopted.

Table 8: Projected change in future values of design depths

T	Depth (mm)	Adjusted Depth (mm)	Change
2-y	74.8	83.63	11.8%
5-y	106.9	121.65	13.8%
10-y	132.2	151.50	14.6%
25-y	168.4	194.33	15.4%
50-y	198.9	230.33	15.8%
100-y	233.9	271.56	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:

T_c = 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:

T_c 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 T_c should be multiplied by an adjustment factor to make the equation applicable in different Landuse type.

For urbanized areas, the adjustment factor is equal to 0.4.

Minimum Time of Concentration

Although travel time from individual elements of a system may be as short as five minutes (inlet time to tertiary drainage system), the total nominal flow travel time to be adapted from any catchment to its point of entry into the primary drainage system should not be less than 10 minutes, (Queensland Urban Drainage Manual, 2007).

1.2.6 Delineation

Delineation is used to define boundaries of the drainage basins, and/or to divide the drainage basins into sub-catchments. Delineation is a part of the process known as watershed segmentation, i.e., dividing the watershed into discrete land and channel segments to analyse watershed behavior.

Physical parameters of the drainage areas are very significant for the hydrologic analysis.

Based on the available topographic data, the physiographical characteristics of each basin were determined, in order to obtain all information concerning areas, altitudes, slopes, morphometric parameters, along with information concerning principal streams.

The Delineation was generated based on the DTM from SRTM, ALOS or the LIDAR data depends on the availability

Based on the above, the limits of the catchment areas of the watercourses boarding or crossing the site were delineated. Main streams are also traced as well as the maximum and minimum elevations along them. Catchment areas and the main course length are measured.

The Delineation was generated based on the DTM from the LIDAR data.

As such, the proposed drainage system along the project roads was designed aiming as much as possible at draining redirect storm flow discharge into the existing natural watercourses.

Based on catchments delineation for project location there is no streams pass through this site so the drainage system will be provided to collect the surface water. The main target of the storm water

management works is to restrict the flow spread of rainwater on road surface to a limit that will not obstruct or pose a hazard to traffic.

The surface storm water on roads will be collected through proposed closed ditches located under sidewalk, Ditches section is trapezoidal, and water will be intercepted through curb openings Ditches will direct water flows to the existing drainage systems under the surrounding roads.

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:

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

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

Where:

A = Area of wetted cross section of the channel, m²
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 9**.

Table 9: 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 conduct the hydraulic analysis on the bridges using the one-dimensional HEC-RAS hydraulic modelling software and the two-dimensional RMA2 Hydrodynamic model (if required in case of the existence of significant meandering effects). A bridge should always be put perpendicular to the flow. If the roadway/railway crosses a wadi at some angle, then the bridge should ordinarily be a skew bridge. Moreover, the abutments and bridge piers' alignment should be parallel to the flow direction. The following points will be considered:

- The depth of foundation At least = $(2.67 d_s - \text{upstream water depth})$; where d_s 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

There is an existing drainage system in the roads at Kahama central business district (CBD), which needs evaluation and improvements. The main target of the storm water management works is to restrict the flow spread of rainwater on road surface to a limit that will not obstruct or pose a hazard to traffic.

The proposed storm water management system in project area is designed to collect and dispose of the run-off generated over parking areas, asphalt roads and buildings through a network that is to discharge to Victoria Lake.

The surface storm water on roads will be collected through proposed closed ditches located under sidewalk, Ditches section is rectangular, and water will be intercepted through curb openings

Ditch will direct water flows to the nearest drainage system. In addition, the accumulated storm water at the low point under Isaka road will be directed to the natural stream through an open channel. **Figure 5** shows the proposed drainage scheme.

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.

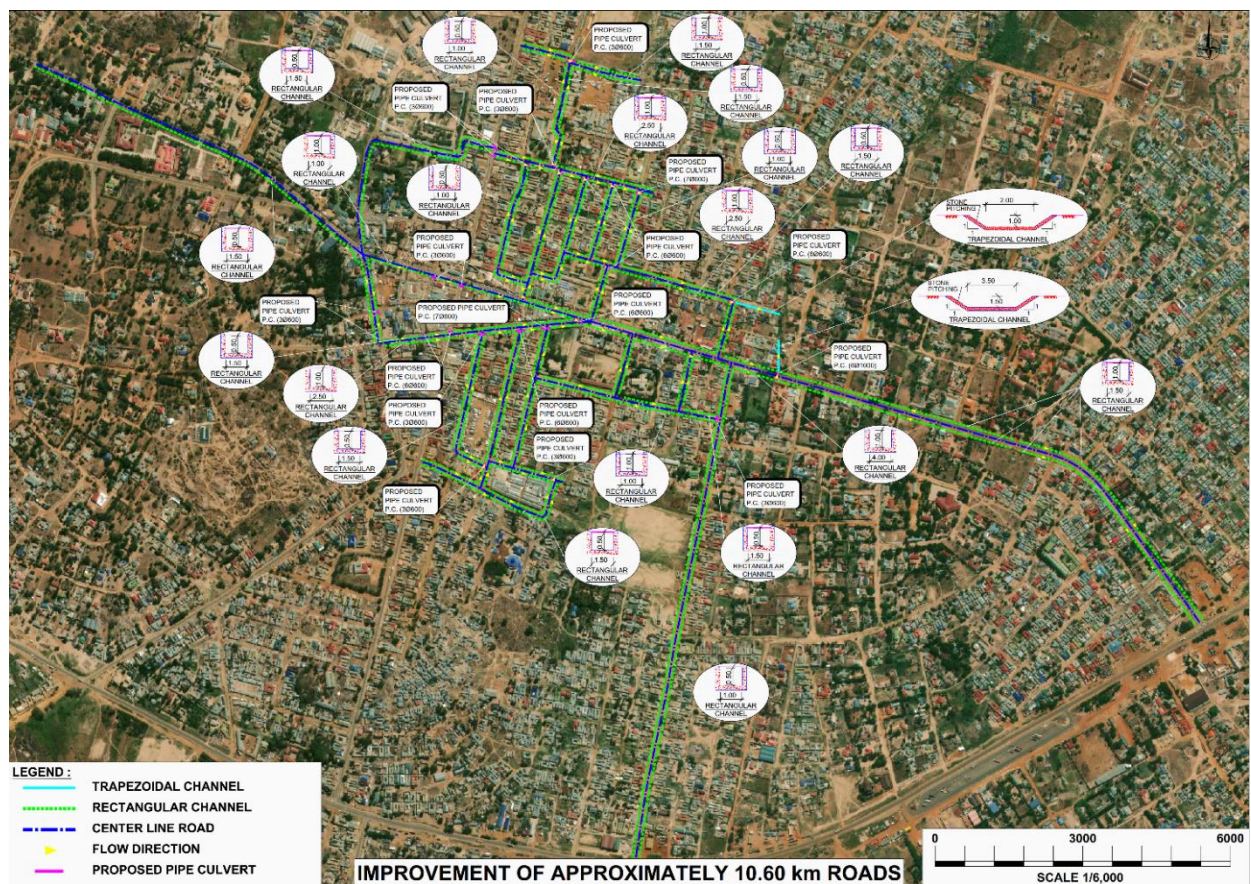


Figure 5: Proposed drainage system for CBD Roads

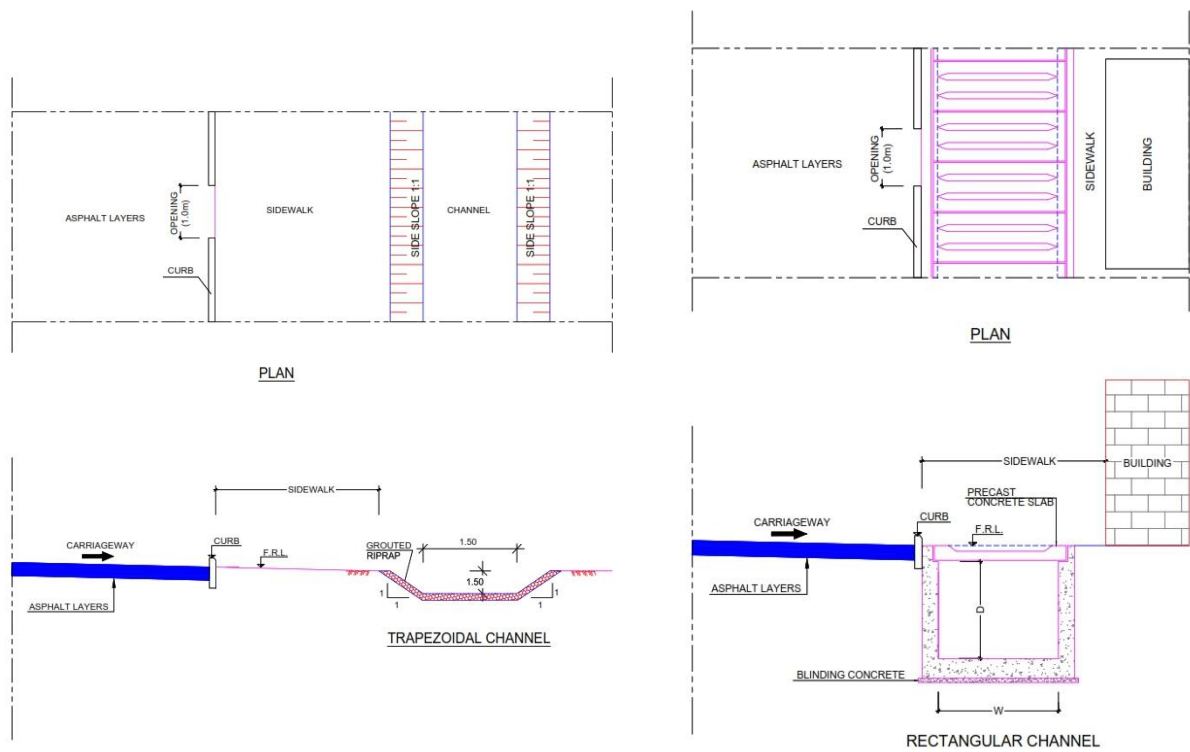


Figure 6: Cross-section for the used channels

Table 10: Sizes for proposed culverts

ID	SIZE	Road
CU01	3x600mm	Q
CU02	3x600mm	Q
CU03	7x600mm	K
CU04	6x600mm	-
CU05	6x600mm	N
CU06	3x600mm	M
CU07	3x600mm	L
CU08	6x600mm	S
CU09	6x600mm	T
CU10	3x600mm	M
CU11	6x1000mm	ISAKA 3
CU14	7x600mm	F
CU15	6x600mm	E
CU16	3x600mm	A
CU17	6x600mm	ISAKA 2

ID	SIZE	Road
CU18	3x600mm	-
CU19	3x600mm	-
CU20	6x600mm	-
CU21	6x600mm	-
CU22	3x600mm	-
CU23	3x600mm	ISAKA2
CU24	3x600mm	A
CU25	3x600mm	D

Table 11: Sizes for proposed channels

ID	SIZE (HxD)	Top Width (m)	Road
DT01	1.50x1.00	1.50	P
DT02	1.00x0.50	1.00	P
DT03	1.00x0.50	1.00	Q
DT04	1.50x0.50	1.50	P - Q
DT05	1.50x1.00	1.50	R
DT06	1.00x0.50	1.00	Q
DT07	1.50x0.50	1.50	Q
DT08	2.50x1.00	2.50	R
DT09	1.00x0.50	1.00	K
DT10	1.50x0.50	1.50	K
DT11	1.00x0.50	1.00	-
DT12	1.50x0.50	1.50	-
DT13	1.00x0.50	1.00	N
DT14	1.50x0.50	1.50	N
DT15	1.50x0.50	1.50	M
DT16	1.50x0.50	1.50	M
DT17	1.50x0.50	1.50	L
DT18	1.50x0.50	1.50	L

ID	SIZE (HxD)	Top Width (m)	Road
DT19_1	2.00x1.00	4.00	S
DT19_2	2.50x1.00	2.50	S
DT20	1.50x0.50	1.50	S
DT21	1.50x0.50	1.50	S
DT22	1.50x0.50	1.50	S
DT23	1.00x0.50	1.00	T
DT24	1.50x1.00	1.50	T
DT25	1.00x0.50	1.00	L
DT26_1	3.50x1.50	6.50	ISAKA 3
DT26_2	1.50x0.50	1.50	ISAKA 3
DT27_1	4.50x1.00	4.50	ISAKA 2&3
DT27_2	2.50x1.00	2.50	ISAKA 2&3
DT28	1.00x0.50	1.00	I
DT29	1.50x0.50	1.50	I
DT30	1.00x0.50	1.00	H
DT31	1.00x1.00	1.00	H
DT32	1.00x1.00	1.00	ISAKA 1
DT33	1.50x1.00	1.50	ISAKA 2
DT34	1.00x0.50	1.00	F
DT35	1.50x0.50	1.50	F
DT36	1.50x0.50	1.50	E
DT37	1.00x1.00	1.00	E
DT38	1.50x0.50	1.50	A
DT39	1.50x0.50	1.50	A
DT40	1.50x0.50	1.50	ISAKA 2

ID	SIZE (HxD)	Top Width (m)	Road
DT41	1.00x0.50	1.00	A
DT42	1.00x0.50	1.00	B &C
DT43	1.50x0.50	1.50	G
DT44	1.00x1.00	1.00	G
DT45	1.50x1.00	1.00	D
DT46	1.50x0.50	1.50	B & C
DT47	1.50x0.50	1.50	B & C
DT48	1.50x0.50	2.50	D
DT49	1.50x1.00	1.50	ISAKA 3
DT50	1.50x1.00	1.50	ISAKA 3
DT51	1.50x1.00	1.50	ISAKA 3
DT52	1.50x1.00	1.50	ISAKA 3
DT53	1.00x0.50	1.00	Y
DT54	1.00x0.50	1.00	Y
DT55	1.00x0.50	1.00	Y
DT56	1.00x0.50	1.00	Y
DT57	1.00x0.50	1.00	Kahama School
DT58	1.00x0.50	1.00	Kahama School
DT59	1.00x0.50	1.00	ISAKA 4

Appendix VI: Geotechnical Study Report

1 GEOTECHNICAL

1.1 Introduction

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 Kahama 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. Kahama 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 Shinyanga Region.

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).

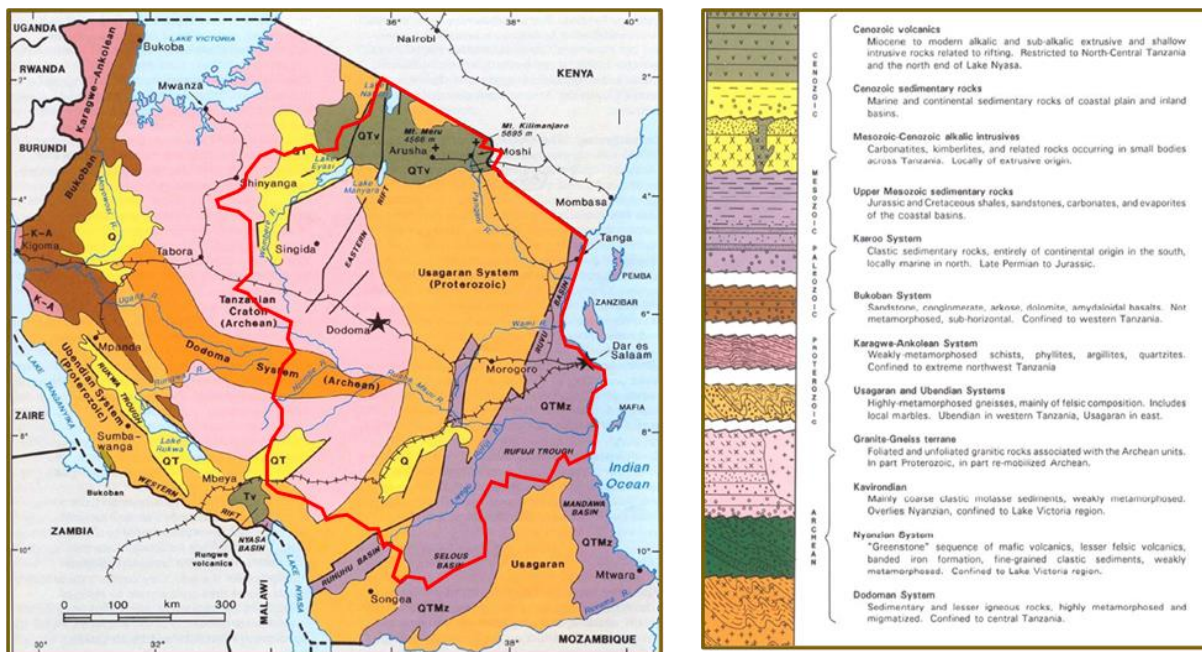


Figure 1: Google Earth satellite Images showing the site history of the project area.

1.3.1 General Geological Setting of Kahama

The City of Kahama is located in the northwestern part of Tanzania to the south of Lake Victoria. It is characterized by flat to undulating topography with some isolated hills of different elevations that are dissected by valleys/wadis. The rock units of the Kahama area are composed mainly of; Quaternary sediments that consist of alluvial deposits, sandy residual soils that derived from granitic rocks, and laterite soils derived from greenstone. These sediments are underlain by granodiorite granite and some biotite granite. Shear zones are the most common discontinuities in the project area-oriented NW-SE and N-S directions and the rocks are affected by two sets of faults-oriented NW and NE. regarding the site levels, Mbulu bus terminal and Sango market parking are on an elevation 1222m MSL, and Zongomela industrial area is on an elevation ranging from 1226m to 1231m MSL.

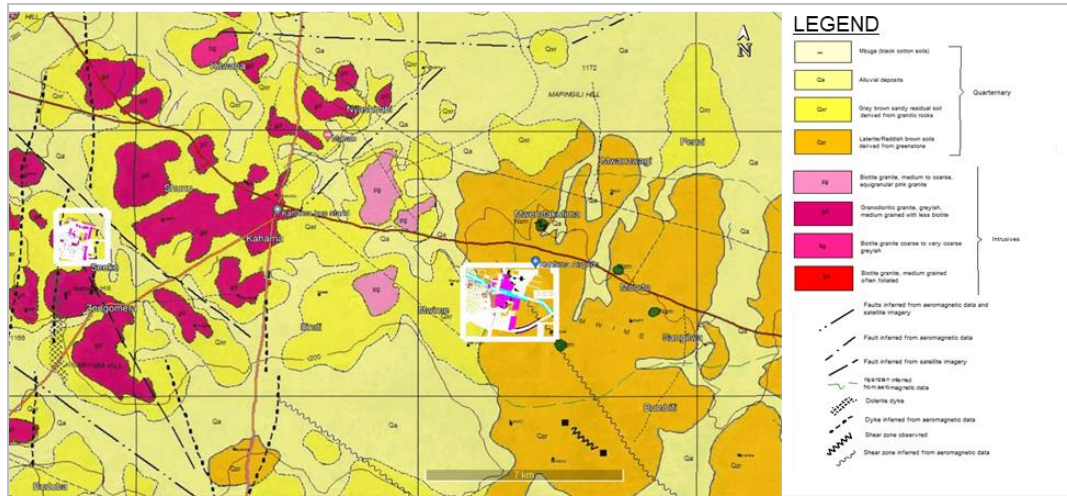


Figure 2 Geologic map of Kahama, Geological Survey of Tanzania, 2002, (Scale 1:100,000)

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. 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 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.

Kahama 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 SO ₄), (mg/l)	pH	Chloride (as Cl), (mg/l)	Sulphate (as SO ₄), (mg/l)	pH
Min.	632.3	901.1	5.99	85.90	20.30	6.37
Max.	1053.8	5299.7	8.82	343.6	223.5	7.78
Average	832.98	3000.22	7.58	240.52	136.53	7.05
Adopted in Analysis*	983.53	4,755	8.37	343.6	223.5	7.78
Count	14	14	14	19	19	19

*For the soil samples and noting the number of tested samples, the average of the highest two test results were considered for the analysis of the exposure conditions whereas the maximum concentrations were considered for the groundwater samples.

The foundations and other substructure concrete elements are anticipated to be in contact with shallow groundwater. 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 1.6.2 below.

1.5 Geotechnical Recommendations

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

1.5.1 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.

1.5.2 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/m³.
- 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.

1.5.3 Foundation Recommendations for the Culverts

- Allowable bearing capacity of the soil under the culvert is 100 kPa. The foundation depth is 1.50m for culverts at C-BH-01 & C-CU-01. The foundation depth is 1.0m for the culvert at C-CU-02.
- For Culvert at the location of C-BH-01: Excavation should proceed below foundation level down 2.2m. For culvert at C-CU-01: Excavation should proceed below foundation level down 1.0m. For culvert at C-CU-02: Excavation should proceed below foundation level down 0.5m. Any loose layers fill materials, soft spots and any inferior materials such as broken or loose rocks at the excavation level should be totally removed and replaced by an approved material as directed by the Engineer.
- The excavation level should be flooded with water, where applicable, for not less than 48 hours and then left to dry. The excavation level should be well compacted using a vibratory roller with a static load that is not less than 15.0 tones to its maximum dry density under the supervision of a qualified geotechnical engineer.
- An approved replacement back-fill material (Engineered fill) of 2.2m thickness for the culvert at C-BH-01, 1.0m for the culvert at C-CU-01, and 0.5m for the culvert at C-CU-02 should be then placed in compacted layers as per earthmoving Specifications from the excavation level to reach the foundation level with a protrusion of the same thickness all around.
- In case of open excavation, the Contractor is to guarantee a safe excavation slope not steeper than 2.0 Horizontal: 1.0 Vertical. Otherwise, an excavation supports and protection systems/shoring capable of safely resisting soil and groundwater pressures, shall be designed, provided, installed, monitored and maintained for supporting the sides of the excavation without disturbing the underlying soil or causing any damage to adjacent structures, utilities, pavements, or other facilities, in a manner accepted to the Engineer, at the Contractor’s sole risk and responsibility. The Contractor is also responsible for removing the excavation supports and protection systems when they are no longer needed without disturbing the underlying soil or causing any damage to adjacent structures, utilities, pavements, or other facilities.
- Unless shoring/side support is used, the Contractor is to follow the default construction sequence. This includes the excavation and erection of deeper footings adjacent to any shallower ones. Excavation close to existing foundations/raft is prohibited unless special precautions are taken after consulting the Engineer.
- If the ground water is encountered during foundation excavation, or need arises to excavate below the groundwater level, a dewatering system is to be maintained to lower the water level below the

proposed excavation/foundation levels by a minimum of 0.50 m to enable inspection, cleaning and pouring of concrete in the dry. The dewatering system is to be designed to ensure that there is no migration of fines during dewatering.

- The backfill behind and above the walls of the culverts is to follow the “soil filling and backfilling for roads” Specifications
- The soil/GW is to be considered aggressive requiring protection against chemical attacks.

1.5.4 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 Material Source

Existing and Virgin Sources of gravel, rock/aggregate, sand and water were sampled and tested in the study area as detailed in this section (refer to Appendices of factual data).

The performed tests for the potential Gravel sources are:

- Grading (particle size distribution),
- Atterberg Limits,
- Moisture/density relationship,
- California Bearing Ratio (CBR)
- Any other necessary tests as per PMDM.

The performed tests for the potential sources of hard stone are:

- Los Angeles Abrasion,
- Aggregate Crushing Value (ACV) and or Ten Per Cent Fine Value (TFV),
- Sodium Sulphate Soundness,
- Bitumen Affinity,
- Specific Gravity and Water Absorption,
- Soluble salts content,
- Aggregate Impact Value (AIV),
- Any other necessary tests as per PMDM.

Moreover, the existing water sources for supplying water for construction works were identified and its quantity and quality (pH, Chloride content, and Sulphate content) were assessed. The tests on Sand sources included the gradation, fines content and the organic content.

2.2.1 Locations of Sources of Material

A list of the coordinates of the material sources and estimated quantities is tabulated here below:

Gravel Sources

- KAHAMA Gravel - Mwima Mwendakulima: The estimated quantity is 60000 active.

The test results on some samples show that the gravel is clayey Gravel with sand (71-83% Gravel, 9-23% Sand, 7-18% fines and PMDM class is G15 and G25.

- KAHAMA Gravel - Nyandekwa: The estimated quantity is 15000 not active.

The test results on some samples show that the gravel is clayey Gravel with sand (54-66% Gravel, 21-35% Sand, 11-13% fines and PMDM class is G15.

- KAHAMA Gravel - Lowa: The estimated quantity is 16000 not active.

The test results on some samples show that the gravel is clayey Gravel with sand (75-90% Gravel, 5-9% Sand, 5-16% fines and PMDM class is G25.

Sand Sources

- KAHAMA Sand - Zongomela: The estimated quantity is 8500 active, pit sand.

The sand source has a high fines content and has too many organic impurities. It is not suitable for use in concrete work. Other sources need to be explored

Rock sources

- KAHAMA Quarry - Zongomela: The estimated quantity is 550000 active quarry.

Water source

- KAHAMA – Kofija Mbulu.
- KAHAMA – Bijampola Zongomela

The test results on some samples show that: pH value is 7.34, Chloride content 207 mg/l, and Sulphate content 117 mg/l. The water sources are both suitable for construction works. Care should be taken not to contaminate or deplete adjacent public water sources.

	Area	Easting	Northing	Estimated Quantity	Distance from city (km)
GRAVEL SOURCES					
1	KAHAMA Gravel Mwima - Mwendakulima	461,922.30	9,572,812.20	60000 - Active	7.5
2	KAHAMA Gravel - Nyandekwa	447,044.00	9,569,243.10	15000 - not Active	10
3	KAHAMA Gravel - Lowa	443,383.50	9,568,124.40	16000 - not Active	13.5
SAND SOURCES					
1	KAHAMA Sand - Zongomela	448,273.90	9,571,328.40	8500 - Active Pit Sand	7.8
QUARRY / Rock Sources					
1	KAHAMA Quarry - Zongomela	448,233.50	9,571,480.80	550000 quarry Active	8
WATER SOURCES					
1	KAHAMA - Kofija Mbulu	459,542.30	9,575,667.80	Dam	4.6
2	KAHAMA - Bijampola Zongomela	454,776.10	9,575,370.30	Dam	0.5

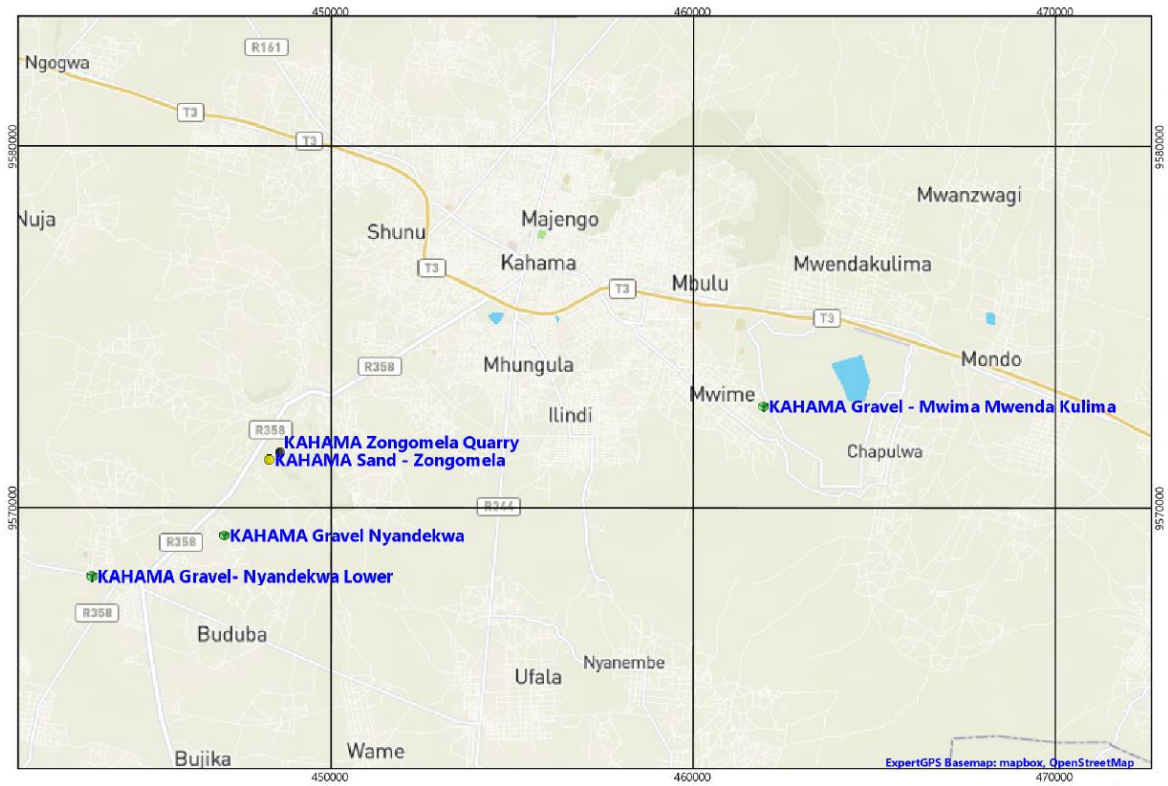


Figure 4: Coordinates and locations of Sources of materials for Kahama

Appendix VII: Design of Stormwater Drainage

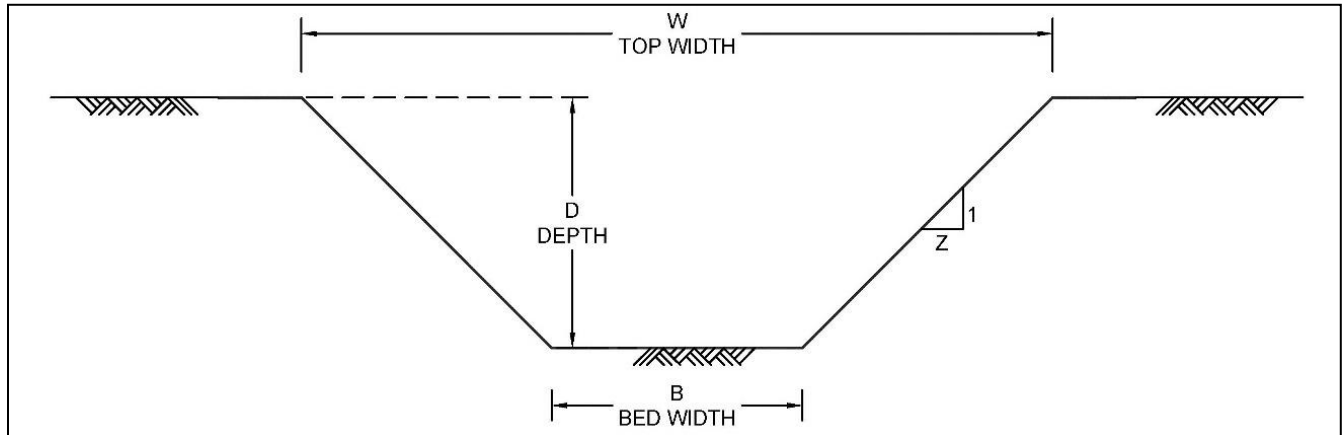


Figure 1: Typical Cross-Section for an Earth Channel

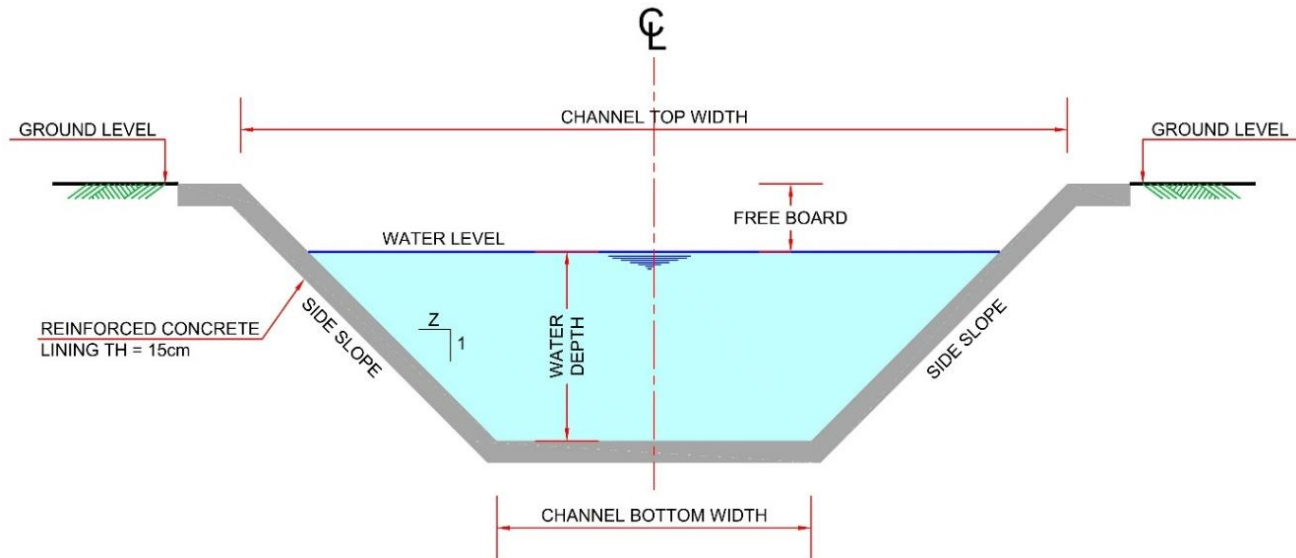


Figure 2: Typical Cross-Section for a Concrete Lined Channel (Bed and Sides)

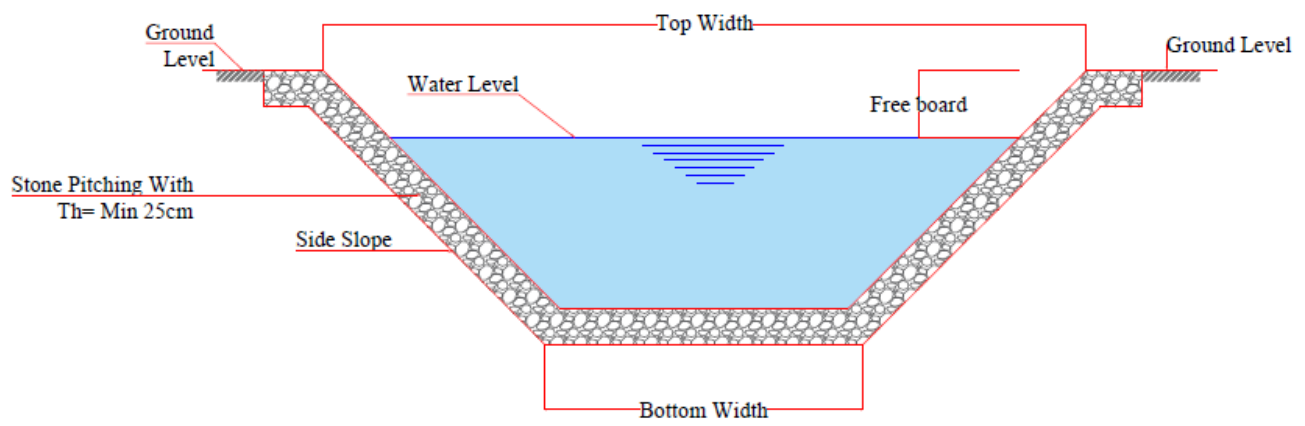


Figure 3: Typical Cross-Section for a Grouted stone-pitching Lined Channel (Bed and Sides)

**ENGLISH-SWAHILI VERSION OF NON-TECHNICAL EXECUTIVE
SUMMARY FOR THE PROPOSED UPGRADING OF 10.6KM ACCESS
ROADS IN THE CENTRAL BUSINESS DISTRICT AND THE
REHABILITATION OF 3KM STORM WATER DRAINS IN KAHAMA
MUNICIPAL COUNCIL, SHINYANGA REGION**

PROPONENT:

Kahama Municipal Council

P.O.B Ox 472, Kahama

Tel: +255 282710032/ +255719679464

E-mail : md@kahamamc.go.tz / info@kahamamc.go.tz

Web: www.kahamamc.go.tz

SUBMITTED TO:

The National Environment Management Council (NEMC)

Regent Estate, Plot No. 29/30

P.O. Box 63154, Dar es salaam, Tanzania

Tel: +255 22 2774889 or +255 22 2774852

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: 14TH JULY, 2023

NON-TECHNICAL EXECUTIVE SUMMARY

1. Title and location of the project/undertaking

Environmental and Social Impact Statement for the Proposed Improvement of Roads at the Central Business District and the Construction of Storm Water Drain at Kahama Municipal Council, Shinyanga Region

2. Name of the proponent and contacts

Kahama Municipal Council

P.O.B Ox 472, Kahama

Tel: +255 282710032/ +255719679464

E-mail : md@kahamamc.go.tz / info@kahamamc.go.tz

Web: www.kahamamc.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 improvement of Kahama CBD roads and storm water drain in Kahama Municipality as part of the Tanzania Cities Transforming Infrastructure and Competitiveness (TACTIC) project financed by the World Bank (WB). Despite Kahama Municipality being rapidly growing city with most of the areas well developed and occupied, there are some areas which are not easily accessible causing traffic on accessible roads. This is due to poor quality of roads that lack drains and have potholes whereby during rainy seasons, the areas flood and on dry seasons there is dust pollution. 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. The construction of 3km storm water drain will reduce floods because Kahama is a low land area and hence significantly affected by floods during rain seasons.

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

Kahama Municipal Council's roads are mostly constructed in the areas which were once used for agriculture activities especially growing of paddy. Therefore, most of the habitants and roads are either flooded or waterlogged during the rainy season. Kahama Municipal Council's aim is to link roads at CBD with existing tarmac roads. The project plans to construct 10.6 Km of roads at CBD these roads are: Mikaratusini 415m, Vumilia 380m, TASAF 110m, Market 180m, Unyamwezini 420m, Namanga 370m, Muslim 490m, KKKT 168m, Chizi 155m, Shoo 135m, NHC 290m, John Wagi 207m, Mkonge 206m, Machage 350m, Manyovu 350m, Mahongo 270m, Majani-Mapana 150m, Royal 385m, Mama Farida 1,330m, Isaka Road 3500m.

Apart from the roads network the project will undertake the construction of the 3km storm water drain. The construction of the 3km is selected out of the total 13.5km of the storm water drain that passes though Kahama Municipal Council and are in need of construction. The wards which the storm water drain passes include Kahama CBD-4 Km, Majengo 3 Km, Nyahanga Km 2, Mhongolo Km 1.5, Nyasubi Km 2 and Mhungula Km 1.

The proposed project being a community service is projected to benefit a lot of people from different corners of Kahama Municipality who will use the road to travel from one place to another for several activities and also reduce flooding in areas where the drains cross. Kahama 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 Kahama 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 stakeholder's views and concerns support the proposed project. All the comments received from the stakeholders were compiled, summarized and sorted to identify issues that have been addressed in the full and detailed Environmental Impact Assessment. A matrix with planned schedule of visits was prepared to guide the team to consult all stakeholders that were identified. Stakeholders were identified using simple methods such as focus group discussion and key informant interviews. In all the process of stakeholder consultation professional discussion was key especially when exploring technical issues. The stakeholders identified include but not limited to Kahama District Council including the District Executive Director and the entire team (legal, community development, environment, physical planning, engineering), Kahama Urban Water Supply and Sanitation Authority (KUWASA), TANESCO, Kahama Office, Association of people with disabilities, Association of traders along the proposed roads, Representatives of the Association of taxi drivers parking in various points along the proposed roads, Office of the Mayor of Kahama Municipal Council, Mini bus stand users, All wards where the proposed roads are passing, All mtaa officers where the proposed roads are passing, Communities in all areas where the proposed roads are passing. Major issues of concern raised were:

- ***Relocation of the Utilities/Infrastructure;*** The project site has utilities crossing or running parallel TANESCO, KUWASA, TTCL and TARURA were consulted regarding this. It was observed that the cost for relocation of the infrastructures is incurred by developer (Kahama Municipal Council) and must be part of the budget for the proposed project. These authorities/companies must be involved from the initial stages of the project
- ***Soil/Water Pollution;*** during construction, the contractor should be careful with the rivers/streams.
- ***Compensation of affected properties;*** Even though the proposed road shall maintain the same existing alignment, 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

- ***Jobs creation to be considered for the locals in order to improve the local economy.***
This will be important as Kahama Municipal Council has enough number of semi-skilled and unskilled labourers to work in the project for the entire period.

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. Increased income to local communities due to employment and selling of foods and goods in the construction areas
- Negative Social Impacts
 - i. HIV / AIDS among workers and nearby communities
 - ii. Safety and health risks due to influx of people working for the project
 - iii. Unwanted pregnancy
- Positive Environmental Benefits
 - i. Improved environment which consists of standard drainage system
 - ii. Improved air quality due to expected greenery
 - iii. Reduced flooding in the areas where the drains will be constructed
- Negative Environmental Impacts
 - i. Loss of natural vegetation
 - ii. Increased Dust and noise levels
 - iii. Waste management problems during construction
 - iv. Safety and health risks
 - v. Population influx from labourers
 - vi. Vibration pollution

(b) Impacts associated with Operation Phase

- Positive Social Benefits
 - i. Benefits to communities resulting from employment
 - ii. Increased accessibility of the areas
 - iii. Improved social services
 - iv. Increased land value and development
- Negative Social Impacts

- i. HIV / AIDS among workers and nearby communities
 - ii. Community safety caused by the influx of workers
 - iii. Unwanted pregnancy
- Positive Environmental Benefits
 - i. Improved environment which consists of standard drainage system
 - ii. Improved transportation of people and luggage
 - iii. Improved air quality due to expected greenery
- Negative Environmental Impacts
 - i. Increased pressure on social services and utilities
 - ii. Increased Dust and noise levels
 - iii. Increased waste during operations

(c) Impacts associated with Demobilization Phase

The following key issues are associated with decommissioning phase:

- Negative Social Impact
 - i. Loss of employment which might lead to poor quality of life
- Negative Environmental Impact
 - i. Production of rubble and associated disposal problems
 - ii. Noise and Dust Pollution

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;

- ***Delay caused by relocation of utilities:*** The TANESCO, KUWASA and TTCL shall be involved from the early stages of these project so as to have an integrated planning.
- ***Disturbance to communities caused by disruption of community services and infrastructures, as well as closure of roads:*** Early notice shall be given to the community before any service interruption.
- ***Erosion caused by soil clearance:*** Unnecessary ground clearance and sensitive re-alignments shall be avoided.
- ***Erosion caused by storm water on steep slopes and sharp corners:*** 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.
- ***Possibility of soil or water pollution due to oil and fuel spillage:*** 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.
- ***Soil and water pollution caused by construction solid waste:*** 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.

- ***Pollution caused by noise, dust or vibration:*** 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.
- ***Poor air quality caused by dust:*** 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.
- ***Health and safety of workers:*** Appropriate working gear (such as nose, ear mask and clothing) and good camp management shall be provided.
- ***Community health and safety:*** The road design shall take account of safety concerns especially at human habitation crossings e.g. installation of bus stops at settlement centres.
- ***Accidents and incidents to community members and construction workers:*** 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.
- ***Littering around construction sites:*** Adequate number of waste bins shall be provided at the construction sites.
- ***Removal of trees and other vegetation along the road:*** 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.
- ***Accidents and incidents along the construction roads:*** Installation of proper road signs and regular inspections for their presence, also installation of speed control devices like humps, as well as installation of pedestrian lanes at human settlement crossings

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 construction Kahama CBD roads and storm water drain). Adopting this option would mean avoiding most of the negative effects associated with the project and missing all the positive benefits such as benefits to communities resulting from employment during construction and increased accessibility by improved roads and reduced floods due to construction of storm water drainage.

(b) Alternative Analysis for Selection of Sites

The option of using another site apart from that of the proposed one was also considered. However, the Proposed site was observed to have the following advantages over others;

- The site is owned by Kahama Municipal Council

- The road is located on a favourite piece of land.
- It is surrounded by residential and institutional activities; it is in the CBD area.

(c) Alternative Analysis for Technology and materials options

Generation of noise from the construction activities (welding, compaction, drilling, trenching etc) will raise the noise level at the site. Thus, to prevent these adverse effects to the surrounding community, the contractor will use machines that do not generated a lot of noise. Therefore, the proposed project will employ the use of locally and internationally accepted materials and equipment to achieve public health, safety, security and environmentally aesthetic requirements.

(d) Alternative analysis for energy options

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

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 Kahama 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

Kahama Municipal Council has set aside a total of 8.05 billion Tanzania shillings as initial cost for the improvement and construction 10.6 km of Kahama CBD roads and 3km of storm water drains. 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. 125,0000,000 and TZS 71,500,000 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 construction of the Kahama CBD roads and storm water drain entail 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 UJENZI WA KM 10.6 ZA
BARABARA ZA WILAYA YA BIASHARA YA KATI NA KM 3 ZA
MITARO YA MAJI YA MVUA, MANISPAA YA KAHAMA, MKOANI
SHINYANGA**

MUENDELEZAJI (MTEJA)

Halmashauri ya Manispaa ya Kahama

S.L.P 472, Kahama

Simu: +255 282710032/ +255719679464

Barua pepe : md@kahamamc.go.tz / info@kahamamc.go.tz

Tovuti: www.kahamamc.go.tz

IMEWASILISHWA KWA:

Baraza la Taifa la Hifadhi na Usimamizi wa Mazingira (NEMC)

35 Regent Street

S. L. P. 63154, Dar es salaam, Tanzania

Simu: +255 22 2774889/ +255 22 2774852/+255 713 608938

Barua Pepe : dg@nemc.or.tz

Tovuti: www.nemc.or.tz

MTAALAMU MUELEKEZI:

ROSEMARY C. NYIRENDA

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

Barua pepe: rosemary.nyirenda35@gmail.com

TAREHE YA KUWASILISHA: 14 JULAI 2023

MUHTASARI USIO WA KIUFUNDI

1. Kichwa na eneo la mradi/shughuli

Tathmini ya Athari za Kimazingira na Kijamii kwa mapendekezo ya kuboreshwa kwa Barabara za Wilaya za Kati za Biashara na Ujenzi wa Mitaro ya Maji ya Mvua katika Halmashauri ya Manispaa wa Kahama, Mkoa wa Shinyanga

2. Jina la Mwekezaji na anwani

Halmashauri ya Manispaa ya Kahama

S.L.P 472, Kahama

Simu: +255 282710032/ +255719679464

Barua pepe : md@kahamamc.go.tz / info@kahamamc.go.tz

Tovuti: www.kahamamc.go.tz

3. Majina na anuani za Kampuni ya Wataalamu iliyofanya TAM

ROSEMARY C. NYIRENDA

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

Barua pepe: rosemary.nyirenda35@gmail.com

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 Kahama CBD na mtaro wa maji ya mvua katika Manispaa ya Kahama ikiwa ni sehemu ya mradi wa kubadilisha miundombinu na ushindani wa Miji Tanzania (TACTIC) unaofadhiliwa na Benki ya Dunia (WB) Licha ya Manispaa ya Kahama kuwa jiji linalokuwa kwa kasi huku maeneo mengi yakiwa yameendelezwa na kukaliwa, yapo baadhi ya maeneo ambayo hayafikiki kwa urahisi na kusababisha msongamano wa magari katika barabara zinazopitika.

Hii inatokana na ubora duni wa barabara ambazo hazina mifereji ya maji na kuwa na mashimo ambapo wakati wa mvua, maeneo hayo hufurika na wakati wa kiangazi kuna uchafuzi wa vumbi. Mradi utasaidia jamii kando ya mradi na jumuiya ya karibu kuingiliana kwa urahisi na CBD hivyo kuongeza mapato yao, mradi pia utasababisha kuanzishwa kwa biashara nyingine mpya kwenye mstari wa mradi, kupunguza muda wa kusafiri na upatikanaji wa kijamii. huduma. Ujenzi wa mitaro ya maji ya dhoruba yenye urefu wa kilomita 3 utapunguza mafuriko kwa sababu Kahama ni eneo la chini la ardhi na hivyo kuathiriwa kwa kiasi kikubwa na mafuriko wakati wa mvua.

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

Barabara za Halmashauri ya Manispaa wa Kahama hujengwa zaidi katika maeneo ambayo yalikuwa yakitumika kwa shughuli za kilimo hasa kilimo cha mpunga. Kwa hiyo, wengi wa wakazi na barabara huwa na mafuriko au maji wakati wa msimu wa mvua. Lengo la Halmashauri ya Manispaa wa Kahama ni kuunganisha barabara za CBD na barabara zilizopo za lami. Mradi unapanga kujenga barabara za Km 10.6 katika CBD barabara hizi ni: Mikaratusini 415m, Vumilia 380m, TASAF 110m, Soko 180m, Unyamwezini 420m, Namanga 370m, Muslim 490m, KKKT 168m, Chizi 155m, Shoo 135m, NHC 290m 290m 5m 3m 6 Machage, John 7 Wagi Manyovu 350m, Mahongo 270m, Majani -Mapana 150m, Royal 385m, Mama Farida 1,330m, Isaka Road 3500m. Kando na mtandao wa barabara mradi utafanya ujenzi wa bomba la maji ya mvua la kilomita 3. Ujenzi wa kilomita 3 umechaguliwa kati ya kilomita 13.5 za mtaro wa maji ya mvua unaopita katika Halmashauri ya Manispaa wa Kahama na zinahitaji ujenzi. Kata ambazo mkondo wa maji ya mvua hupita ni pamoja na Kahama CBD-4 Km, Majengo Km 3, Nyahanga Km 2, Mhongo Km 1.5, Nyasubi Km 2 na Mhungula Km 1.

Mradi unaopendekezwa kuwa wa huduma kwa jamii unatarajiwa kuwanufaisha wananchi wengi kutoka pembe mbalimbali za Manispaa ya Kahama ambao watatumia barabara hiyo kusafiri kutoka sehemu moja hadi nyingine kwa shughuli kadhaa na pia kupunguza mafuriko kando ya mifereji. Halmashauri ya Manispaa ya Kahama, Wizara ya Fedha, TAMISEMI, TARURA 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 Manispaa ya Kahama na wadau wote wa sekta ya usafirishaji na uhifadhi kwa takriban zaidi ya miaka 30 baada ya kukamilika.

5. Mfumo wa Sera, Sheria na Kitaasisi

Sera na sheria mbalimbali ambazo zinahusiana na zinaongoza utekelezaji wa mradi huu ni pamoja na Dira ya Maendeleo ya Tanzania 2025, Sera ya Taifa ya Mazingira ya 2021, Sera ya uchukuzi (2003), Sera ya Sekta ya Ujenzi (2003), Sera ya Taifa ya Ardhi (1995), Sera ya Taifa ya Jinsia (2002), Sera ya kukuza Uwekezaji (2003) na Sheria ya Usimamizi wa Mazingira (Sura ya 191), 2004, na Kanuni za Tathmini na Ukaguzi wa Athari kwa Mazingira (2005) kama ilivyorekebisha mwaka 2018. Sheria nyingine ni kama vile; Sheria ya Majisafi na Usafi wa Mazingira (2019), Sheria ya Ardhi namba 4 ya 1999, Sheria ya Mipango Miji (2007), Sheria ya Afya na Usalama Kazini (2003), Sheria ya Ajira na Mahusiano Kazini (2015), Sheria ya Usajili Wahandisi (2007), Sheria ya Usajili wa Makandarasi (1997), Sheria ya Serikali za Mitaa (Mamlaka za Mijini) (Sura ya 288), Sheria ya Wasanifu Majengo na Wakadiriaji Majenzi (1997), na Sheria ya VVU na UKIMWI (Kinga na Kudhibiti) (2008).

Pia kuna Mfumo wa usimamizi wa mazingira na jamii wa Benki ya Dunia unaoeleza Viwango kumi (10) vya Mazingira na Kijamii ambavyo vinapaswa kufuatwa wakati wa utekelezaji wa miradi hususani ile inayofadhiliwa na Benki ya Dunia. ESS1: Tathmini na usimamizi wa Hatari na Athari za Mazingira na Kijamii; ESS2: Masuala ya Ajira na Mazingira ya Kazi; ESS3:

Ufanisi wa Rasilimali na Kuzuia na Kusimamia Uchafuzi; ESS4: Afya na Usalama ya Jamii; ESS5: Utwaaji wa Ardhi, Vizuizi vya Matumizi ya Ardhi na Uhamishaji wa Watu na Makazi bila Hiari; ESS6: Uhifadhi wa Bioanuwai na Usimamizi Endelevu wa Maliasili Hai; ESS7: Wenyeji/Jamii za wenyeji zenye mfumo wa kiasili wa maisha za Kiafrika Kusini mwa Jangwa la Sahara ambazo Kihistoria zimekuwa haziangaliwi kwenye masuala ya maendeleo kutokana na mfumo wao wa Maisha na tamaduni zao; ESS8: Urithi wa Kitamaduni; ESS9: Waamuzi wa Fedha; na ESS10: Ushirikishaji wa Wadau na upashanaji wa habari/taarifa.

Kwa kuzingatia asili ya shughuli za mradi huu, isipokuwa ESS9: Waamuzi wa Kifedha; karibu ESS zote zinahusika katika mradi huu. Mfumo wa Mazingira na Jamii wa Benki ya Dunia unaweka wazi dhamira ya Benki ya maendeleo endelevu, kupitia Sera ya Benki na seti ya viwango vya Mazingira na Kijamii ambavyo vimeundwa kusaidia miradi ya Wakopaji, kwa lengo la kumaliza umaskini uliokithiri na kukuza ustawi wa pamoja. Mfumo wa E&S unajumuisha: (1) Dira ya Maendeleo Endelevu, ambayo inaweka wazi matarajio ya Benki kuhusu uendelevu wa mazingira na kijamii; (2) Sera ya Benki ya Dunia ya Mazingira na Kijamii inaweka masharti na vigezo vya lazima vya kimazingira na kijamii ambavyo Miradi ya Uwekezaji, inayofadhiliwa na Benki ni lazima ikidhi; na (3) Viwango vya Mazingira na Kijamii, pamoja na Viambatanisho vyake, ambavyo vinaweka mahitaji ya lazima yanayotumika kwa Mkopaji na miradi. Hati nyingine ni Miongozo ya Benki ya Dunia ya Mazingira, Kijamii, Afya na Usalama.

6. Mashauriano ya Wadau na Ushirikishwaji wa Umma na matokeo

Kwa ujumla, maoni ya wadau wengi yanaunga mkono mradi uliopendekezwa. Maoni yote yaliyopokelewa kutoka kwa wadau yalikusanywa, kufupishwa na kupangwa ili kuainisha masuala mbalimbali ambayo yameshughulikiwa katika Tathmini kamili na ya kina ya Athari kwa Mazingira. Jedwali lenye ratiba ya ziara lilitayarishwa ili kuiongoza timu kushauriana na wadau wote waliotambuliwa. Wadau walitambuliwa kwa kutumia mbinu rahisi kama vile majadiliano ya vikundi na usaili wa watoa taarifa muhimu wenye uelewa mkubwa wa mradi. Katika mchakato wote wa mashauriano ya wadau mjadala wa kitaalamu ulikuwa muhimu hasa wakati wa kuchunguza na kutathmini masuala ya kiufundi. Wadau hao waliobainika ni pamoja na Halmashauri ya Wilaya ya Kahama akiwemo Mkurugenzi Mtendaji wa Wilaya na timu nzima (sheria, maendeleo ya jamii, mazingira, mipango mizuri, uhandisi), Mamlaka ya Majisafi na Majitaka Kahama (KUWASA), TANESCO, Ofisi ya Kahama, Jumuiya ya watu wenye ulemavu, Jumuiya ya wafanyabiashara pamoja. barabara zinazopendekezwa, awakilishi wa Chama cha madereva teksi wakiegesha sehemu mbalimbali pembezoni mwa barabara zinazopendekezwa, Ofisi ya Meya wa Halmashauri ya Manispaa wa Kahama, Watumiaji wa stendi ya mabasi madogo, Kata zote zinapopita barabara zinazopendekezwa, Maafisa wa mtaa wote ambapo barabara zinazopendekezwa zinapita, Jamii. katika maeneo yote ambayo barabara zinazopendekezwa zinapita.

Masuala makuu na maangalizo yaliyotolewa yalikuwa:

- **Uhamisho wa Huduma/Miundombinu;** Maeneo ya mradi yana huduma zinazovuka au zinazoendesha sambamba na TANESCO, KUWASA, TTCL na TARURA walishauriwa kuhusu hili. Ilibainika kuwa gharama za uhamishaji wa miundombinu hiyo zinagharamiwa na msanidi programu (Halmashauri ya Manispaa wa Kahama) na

lazima ziwe sehemu ya bajeti ya mradi unaopendekezwa. Mamlaka/kampuni hizi lazima zihusishwe kuanzia hatua za awali za mradi.

- **Uchafuzi wa Udongo/Maji;** wakati wa ujenzi mkandarasi awe makini na mito/vijito.
- **Fidia ya mali zilizoathirika;** Ingawa barabara inayopendekezwa itadumisha mpangilio ule ule uliopo, washikadau bado wana wasiwasi kwamba baadhi ya mali zitaathirika. Kwa hiyo, msanidi lazima awe tayari kulipa fidia kwa mali zote zilizoathirika zikiwemo nyumba, maeneo ya biashara, miti iliyopandwa, shamba, mazao na ardhi kama inavyoelekeza sheria za Tanzania.
- **Uundaji wa ajira kuzingatiwa kwa wenyeji ili kuboresha uchumi wa ndani.** Hili litakuwa muhimu kwani Halmashauri ya Manispaa wa Kahama ina idadi ya kutosha ya vibarua wasio na ujuzi na wasio na ujuzi kufanya kazi katika mradi kwa kipindi chote.

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 uboreshaji wa barabara hivyo kuweza kupitika.
- iii. Kuongezeka kwa mapato kwa jamii kwa sababu ya ajira na uuzaji wa vyakula na bidhaa katika maeneo ya 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 maeneo mifereji inapopita

• 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.

- **Ucheleweshaji unaosababishwa na uhamishaji wa huduma:** TANESCO, KUWASA na TTCL zitashirikishwa kuanzia hatua za awali za mradi huu ili kuwa na mipango jumuishi.

- **Usumbufu kwa jamii unaosababishwa na kukatika kwa huduma na miundombinu ya jamii, pamoja na kufungwa kwa barabara:** Taarifa ya mapema itatolewa kwa jamii kabla ya kukatizwa kwa huduma.
- **Mmomonyoko unaosababishwa na kusafisha ardhi:** Usafishaji wa ardhi usio wa lazima na upangaji upya nyeti utaepukwa.
- **Mmomonyoko unaosababishwa na maji ya dhoruba kwenye miteremko mikali na kona kali:** Mifereji ya maji yenye mistari kwenye maeneo nyeti itatolewa ili kudhibiti kasi na wingi wa maji ya dhoruba. Sehemu za kutupia maji zitachaguliwa kwa uangalifu ili kuepuka mmomonyoko wa ardhi ya kilimo na uundaji wa makorongo.
- **Uwezekano wa uchafuzi wa udongo au maji kwa sababu ya kumwagika kwa mafuta:** Uwekaji mafuta wa mimea au uhamishaji wa nyenzo haupaswi kufanywa karibu na vyanzo vya maji, na umwagikaji wowote wa ndani kwenye udongo unapaswa kurekebishwa mara moja.
- **Uchafuzi wa udongo na maji unaosababishwa na taka ngumu za ujenzi:** Utunzaji mzuri wa nyumba utafanywa ndani ya misombo ya kuhifadha nyenzo au yadi za matengenezo ya gari ambapo uwezekano wa kumwagika ni mkubwa. Hii inaweza kufanywa kwa urahisi kwa kutoa matangi ya kumwagika na kizuizi cha Sekondari kwenye yadi za matengenezo ya gari.
- **Uchafuzi unaosababishwa na kelele, vumbi au mtetemo:** Kero ya kelele, mtetemo na vumbi itakuwa ya muda mfupi na mazoezi mazuri ya kazi yanaweza kupunguza. Aidha, athari hizi tayari zinajitokeza kutokana na sehemu za barabara zilizopo.
- **Ubora duni wa hewa unaosababishwa na vumbi:** Umwagiliaji unapaswa kufanywa mara kwa mara katika sehemu zote za kazi zilizo kando ya barabara na katika machimbo na maeneo yote ya kuazima kwa ajili ya ulinzi wa wafanyakazi. Kwa kuongezea, sehemu za barabara zinazopitiwa sana na magari ya ujenzi pia zinapaswa kuloweshwa mara kwa mara.
- **Afya na usalama wa wafanyakazi:** Vyombo vya kufanyia kazi vinavyofaa (kama vile pua, barakoa na mavazi) na usimamizi mzuri wa kambi utatolewa.
- **Afya na usalama wa jamii:** Muundo wa barabara utazingatia masuala ya usalama hasa katika vivuko vya makazi ya binadamu k.m. ufungaji wa vituo vya mabasi kwenye vituo vya makazi.
- **Ajali na matukio kwa wanajamii na wafanyakazi wa ujenzi:** Mpango wa usimamizi wa trafiki utajumuishwa katika miundo ili kujumuisha kwa mfano maelezo ya alama, alama, mpangilio wa makutano, vizuizi vya ufikiaji, vituo vya mabasi, vivuko, njia za miguu n.k.
- **Uondoaji wa miti na mimea mingine kando ya barabara:** Muundo wa barabara utajaribu iwezekanavyo kurekebisha njia ili kuepuka kukata miti yote mikubwa ambayo huchukua miaka mingi kukua au mimea mingine yenye umuhimu mkubwa.
- **Ajali na matukio kando ya barabara za ujenzi:** Uwekaji wa alama sahihi za barabarani na ukaguzi wa mara kwa mara wa uwepo wao, pia ufungaji wa vifaa vya kudhibiti mwendo kasi kama vile nundu, pamoja na uwekaji wa njia za waenda kwa miguu kwenye vivuko vya makazi ya watu.

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 za Kahama CBD na mifereji ya maji ya dhoruba). Kupitisha chaguo hili kunaweza kumaanisha kuepuka athari nyingi mbaya zinazohusiana na uwepo wa mradi na kukosa manufaa yote chanya kama vile manufaa kwa jamii yanayotokana na ajira wakati wa ujenzi na urahisi wa kusafiri kutokana na barabara bora na kupungua kwa mafuriko kutokana na ujenzi wa mifereji ya maji ya mvua.

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 Kahama
- Kiwanja kiko kwenye kipande cha ardhi unachopenda.
- Imezungukwa na shughuli za makazi na taasisi; iko katika eneo la kibiashara la katikati ya Manispaa.

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 manisipaa ya kahama itafanya ukaguzi wa kawaida na kuwasilisha taarifa ya ukaguzi kwa uongozi wa juu ili kuhakikisha uendeleu wa mfumo wa usimamizi wa mazingira.

10. Tathmini ya rasilimali

Halmashauri ya Manispaa ya Kahama imetenga jumla ya zaidi ya shilingi bilioni 8.05 za Tanzania kama gharama za awali za uendelezaji na ujenzi wa barabara za wilaya ya biashara ya kati na mitaro ya maji ya mvua. Fedha hizi zote zitagharomia 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 125,000,000.00 na 71,500,000.00 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

Mapendekezo ya ujenzi wa barabara za Kahama CBD na mifereji ya maji ya dhoruba yanajumuisha athari ndogo 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.