UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MZUMBE UNIVERSITY – MAIN CAMPUS

ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT FOR THE PROPOSED ESTABLISHMENT OF THE TWO ACADEMIC BUILDINGS, CAFETERIA, RESERVOIR TANKS AND COMPOSTING FACILITY AT MZUMBE UNIVERSITY-MAIN CAMPUS, CHANGARAWE VILLAGE, MZUMBE WARD, MVOMERO DISTRICT IN MOROGORO REGION

PROPONENT
MZUMBE UNIVERSITY
P.O.BOX 1
MZUMBE, MOROGORO

MARCH, 2024

EXECUTIVE SUMMARY

1. Introduction

Mzumbe University (MU), through the Government of the United Republic of Tanzania (URT) has received financing from the World Bank to implement Higher Education for Economic Transformation (HEET) Project. Under HEET, MU intends to establish ICT Complex and Innovation Incubation Centre, Cafeteria, Academic Complex, Composting Facility, Reservoir Tanks, and the Rehabilitation of the existing water supply system projects at Mzumbe University's Main Campus in Changarawe Village, Mvomero District, Morogoro Region. However, the construction and operation of the proposed project are expected to have environmental, social and economic impacts, which need to be identified and mitigation measures put in place for ensuring sustainability of the project.

The World Bank Environmental and Social Frameworks (ESF) and Standards (ESSs) as well as the Environmental Management Act of 2004 of Tanzania require project developers to carry out an Environmental and Social Impact assessment (ESIA) prior to project implementation. Through a rigorous ESIA, potential environmental and social impacts will be thoroughly evaluated, and necessary measures will be recommended to ensure the continued harmony between academic growth, infrastructure development, and environmental preservation. Therefore, this study was done in line with Environmental Management Act, Cap 191, the Environmental Impact Assessment and Audit (Amendment) Regulations, 2018, and the World Bank Environment and Social Framework (ESF) as well as the project's Environmental and Social Management Framework (ESMF). In addition, this ESIA has been guided by the Project Appraisal Document (PAD) and Project Operational Manual (POM) both of 2021.

2. Projects Description

The proposed project initiative was driven by the need to accommodate the increasing demand on existing infrastructure due to the development of new facilities, including the Directorate of ICT Complex and Innovation Incubation Centre, Cafeteria, and Academic Complex. Currently, MU has the capacity to cater to approximately 9,154 persons, comprising 546 academic and administrative staff, along with 8,608 students. Therefore, the proposed project will absorb the growing number of graduates from basic education who are both inspired and capable of pursuing higher education in Tanzania.

3. Relevant Policies and Legislation

The National laws, policies, plans, strategies and legislation relevant to this project have been discussed in this report. Furthermore, this ESIA study has also complied with the World Bank's new Environmental and Social Framework (ESF) and applicable World Bank Environmental and Social Standards (ESSs) to HEET project.

4. Stakeholders Engagement

Stakeholder identification and involvement adhered to guidelines specified in the Environmental Impact Assessment (EIA) and Audit Regulations (2005, as amended in 2018), World Bank

Environmental and Social Standards (ESS10), and the Stakeholders Engagement Plan (SEP). Public consultations entailed the sharing of project details, comprehension of stakeholder concerns, and cultivation of community relationships. Key stakeholders were pinpointed based on their roles, significance, influence, and potential impact on the project. The Stakeholders Engagement Plan (SEP) encompassed both national and sub-national levels, with a particular emphasis on sub-national stakeholders. It delineated the specifics of engagement pertaining to project activities, encompassing stakeholders at regional, district, and village tiers. The project aspired to inclusivity by involving women, vulnerable populations, and individuals with special needs. Consultations occurred throughout the project's duration, and mechanisms were instituted to address issues such as Gender-based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH).

The following are some of issues raised by the consulted stakeholders;

- Potential health risks and odors associated with the construction
- Potential contamination of local water sources and its impact on their access to clean water for domestic use.
- Job opportunities that the project could bring, both during the construction and operational phases should give first priorities for local community around the project area.
- Concerns regarding workplace safety during the construction and maintenance of the WSP.
- The contractor should prepare emergency response procedures and access to the site in case of accidents or incidents involving hazardous materials.

5. Impact Assessment and Proposed Mitigation and Enhancement Measures

The project implementation will have environmental and social consequences at various stages throughout its lifecycle. The construction, operation, and closure phases of the proposed project will generate impacts. One of the most significant and noticeable impacts will be the pollution of the surrounding environment, affecting water, land, air, and vegetation. Despite the project being enclosed within a fence, there is still a possibility of direct or indirect impacts on these elements due to the project implementation.

5.1 Significant environmental impact

Negative environmental impacts

- Contamination and /impaired quality of receiving body – land and water
- Increased Air pollution and climate change
- Increased generation of solid and hazardous waste
- Generations of Solid and Hazardous Wastes
- Generations of Liquid Wastes
- Storm water generation and overflow
- Increased vibration
- Air pollution due to dust and gases emission.
- Increased Noise level
- Loss of vegetation
- Impact on natural resource (Energy and water)

- Erosion of Exposed Surfaces
- Increase storm water generation and overflow
- Loss of Visual Aesthetics

Positive environmental impacts

- Contribute to the long-term sustainability of the university's operations by reducing water consumption and potential regulatory fines for pollution.
- Improved visual aesthetics of built environment
- Management of storm water and reduction of environmental pollution
- Proper management of secondary vegetation e.g. trees

5.2 Significant Social Impacts

Positive social impacts

- Job creation and employment opportunities
- Increase in market for local construction materials
- Increase skills and impart knowledge to local communities
- Reduce noise level; this may happen due to the removal of heavy machinery at the project site this will reduce the amount of noise from project area
- Increase of commercial and social activities around project locations
- Growth of trade and increase investment.
- Production of skilled labour force for implementing various development policies, plans and goals for sustainable social and economic growth of the Nation.
- The growth of Banking activities within the project area.
- Occupational Safety and Health impacts
- Community Health, Safety and Security
- Gender discrimination

Negative social impacts

- Child labor
- Food Insecurity
- Increase level of crimes
- Loss of employment and revenues
- Loss of revenue to institutions and the government
- Loss of business opportunity

6. Mitigation and Enhancement Measures

The ESIA report recommends a set of mitigation measures to minimize any adverse effects identified during the assessment. These measures include proper waste management practices, regular monitoring, and community engagement to ensure that the project aligns with sustainable practices.

The developed Environmental and Social Management Plan (ESMP) outlined in this report outlines the schedule for implementing the proposed strategies to mitigate these impacts, as well as plans for ongoing monitoring. It clearly defines the roles and responsibilities of various parties involved in mitigating and monitoring the adverse environmental and social effects. Mitigation and enhancement measures for the ESIA of the proposed establishment of new buildings at MU-Main Campus should be carefully planned and implemented throughout the project's lifecycle. Here are measures for each phase:

a. Potential mitigation and enhancement measures associated with Construction phase

Mitigation measures

- Implement measures to prevent loss of significant secondary vegetation.
- Monitor construction activities to minimize noise and dust pollution.
- Schedule construction activities to minimize disruption to the campus and nearby communities.
- Monitor construction activities to minimize noise and dust pollution.
- Implement effective dust suppression techniques, such as using water sprays or dust suppressants on construction sites to minimize the release of fugitive dust.
- Provide waste handling facilities such as waste bins and skips for temporarily holding domestic waste generated at the site.
- Explore and implement advanced construction techniques that minimize vibrations.
- Ensure the proper selection of appropriate transportation route in consultations with stakeholders, avoiding large agglomerations as well as good Site Practices such as signage and signal personnel where appropriate and vehicle lighting (front and back).

Enhancement Measures

- Employ local labor and contractors to stimulate the local economy.
- Provide training to workers on environmental and safety practices.
- Establish a complaints mechanism for addressing construction-related issues promptly.

b. Potential Mitigation and Enhancement Measures associated with Demobilization phase

Mitigation measures

- Remove all construction equipment and materials from the site.
- Conduct a final site inspection to ensure compliance with environmental standards.

Enhancement Measures

- Restore any temporarily impacted areas to their original state or as agreed upon with relevant stakeholders.
- Hold a community engagement session to inform residents of the completion of construction activities.

c. Potential mitigation measures associated with Operation and Maintenance phase

Mitigation Measures

- Develop a comprehensive reforestation plan to replace cleared vegetation.
- Implement the use of renewable and cleaner energy sources for construction equipment to minimize the emission of greenhouse gases

Enhancement Measures

- Develop a community outreach program focused on environmental education, and climate change mitigation
- Engage with local schools and institutions for educational programs on environmental conservation.
- Promote environmental conservation and sustainable practices within the university community.

d. Potential mitigation measures associated with Decommissioning phase

Mitigation Measures

- Develop a decommissioning plan in accordance with regulatory requirements.
- Safely remove and dispose of any hazardous materials or equipment.
- Remediate the site to its original or agreed-upon condition.

Enhancement Measures

- Engage with stakeholders to determine the future use of the site and its assets.
- Explore opportunities for repurposing infrastructure for community benefit, if feasible.

7. Environmental and Social Management Plan (ESMP)

This report proposes strategies to reduce or avoid the negative social and environmental impacts that have been identified. These strategies, along with a monitoring plan, are outlined in the ESMP (Environmental and Social Management Plan). Most of these measures align with well-established engineering and social practices. The ESMP also defines the roles and responsibilities of various stakeholders involved in the plan. During the construction phase, the primary actors responsible for implementation are the contractor and MU. However, once the operation phase begins, MU will take on the key role in implementing the mitigation measures.

8. Environmental and Social Monitoring Plan (ESMoP)

There are four types of monitoring activities: baseline monitoring, impact monitoring, compliance monitoring, and mitigation monitoring. The contractor's safeguard team, consisting of environmental, social, and safety experts, will conduct the monitoring of environmental and social parameters during the construction phase, supervised by the Consultant's safeguard team. Once the operation phase begins, the responsibility for mitigation and monitoring will shift to the MU. To assess the progress and address any emerging environmental issues, OSHA and/or NEMC will conduct annual EHS reviews, examining environmental concerns alongside the project's implementation status and sensitivity.

9. Cost Benefit Analysis

The Environmental Impact Statement (EIS) evaluates the project by considering its negative impacts in relation to the socioeconomic benefits that would be missed if the project were not carried out. The analysis of the environmental cost-benefit assesses the ratio between the negative and positive impacts. The project offers significant potential financial and social benefits, while the environmental impacts can be adequately mitigated. The financial resources required for mitigating the negative impacts are relatively small compared to the overall investment needed.

10. Decommissioning Plan

The project is anticipated to last for 100 years, and this document outlines an initial decommissioning plan. The plan aims to establish practical decommissioning approaches that can be executed safely, without endangering the public's health and safety, decommissioning personnel, or causing harm to the environment. It adheres to the guidelines and regulations set by relevant regulatory agencies. The purpose of this preliminary decommissioning plan is to ensure that the decommissioning and final disposition of the project though it’s not expected to happen are taken into account during the project's initial design phase.

11. Conclusion

The ESIA report concludes that the proposed establishment of the ICT Complex and Innovation Incubation Centre, Cafeteria, Academic Complex, Composting Facility, Reservoir Tanks, and the Rehabilitation of the existing water supply system projects at MU is environmentally and socially viable. The potential negative impacts identified can be effectively mitigated through the recommended measures, ensuring sustainable project execution. By involving relevant stakeholders in the decision-making process, the project can be implemented with broad support from the community and university stakeholders. The findings and recommendations of this ESIA report provide a solid foundation for responsible project development and environmental stewardship, safeguarding the ecosystem and the well-being of those who will benefit from this vital infrastructure.

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LIST OF ABBREVIATION

AIDS	Acquired Immune Deficiency Syndrome
CBA	Cost Benefit Analysis
C-ESMP	Contractor Environmental and Social Management Plan
CSO	Civil Society Organisation
CSR	Community Social Responsibility
CRDB	Cooperative and Rural Development Bank
DED	District Executive Director
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EIS	Environmental Impact Statement
EMA	Environmental Management Act
ESF	Environmental and Social Framework
ESMP	Environmental and Social Management Plan
ESMF	Environmental and Social Management Framework
GA	Government Authority/Agence
GBV	Gender Based Violence
GHOs	Grievance Handling Officer
GRIC	Grievance Redress Integrity Committee
GRM	Grievance Redress Mechanism
HEET	Higher Education for Economic Transformation
HIV	Human Immunodeficiency Virus
HSE	Health, Safety and Environment
ILO	International Labour Organisation
LGA	Local Government Authority
MoEST	Ministry of Education, Science and Technology
MORUWASA	Morogoro Water Supply and Sanitation Authority
MU	Mzumbe University
NEMC	National Environment Management Council
NGOs	Non – Government Organisation
NPIU	National Project Implementation Unity
OIP	Other Interested Patries
OSHA	Occupational Safety and Health Authority
PAD	Project Appraisal Document
PAPs	Project Affected Person
PIU	Project Implementation Unit
POM	Project Operational Manual
RUWASA	Rural Water Supply
SH	Sexual Harrassment
SEA	Sexual Exploitation and Abuse

SEP	Stakeholders Engagement Plan
UPIU	University Project Implementation Unity
TANESCO	Tanzania Electricity Supply Company
ToR	Terms of Reference
TTCL	Tanzania Telecommunications Company Limited
TZS	Tanzanian Shillings
URT	United Republic of Tanzania
UPIU	University Project Implementation Unit
VEO	Village Executive Officer
WB	World Bank
WEO	Ward Executive Officer
WRBWB	Wami/Ruvu Basin Water Board
WSP	Wastewater Stabilisation Pond

CHAPTER 1: INTRODUCTION

1.1 Background Information

Mzumbe University (MU) is a Public University which operates under the Ministry of Education, Science and Technology (MoEST). The University was established by the Mzumbe University Charter 2007 made under section 25 of the Universities Act. No. 7 of 2005 which repealed the Mzumbe University Act No. 21 of 2001. Mzumbe University's predecessor, the Institute of Development Management (IDM), established in 1972 focused on training skilled human resource in public administration and management, business administration, accountancy, economic planning and hospital administration and related areas for middle cadre officers in the public service and private sector. Currently, the University has three campuses: Main Campus at Mzumbe, Morogoro; Dar es Salaam Campus College and Mbeya Campus College.

MU has received financial support from the World Bank (WB) for Higher Education for Economic Transformation (HEET; P166415). The HEET project is supported by the Government of the United Republic of Tanzania (GoT) through the World Bank. The main Project Development Objective (PDO) is to strengthen the learning environments and labour market orientation of programmes in priority disciplines and the management of the higher education system. Generally, it is done under seven (7) strategic focus areas namely:

i. Increasing enrolment capacity in degree programmes in priority disciplines
ii. Upgrading learning resources and equipment
iii. Promoting applied research and innovation capacity
iv. Building functional linkages with private sector/industry
v. Strengthening use of digital technology
vi. Promote self-generated income
vii. Building capacity of academic staff and university leadership

In strengthening the learning environments and labour market orientation of programmes in priority disciplines the University plans to focus on seven strategic focus areas under HEET project. However, two strategic focus areas (Increasing enrolment capacity in degree programmes in priority disciplines and developing options for self-generating income) will involve construction and rehabilitation projects.

In order to increase enrolment capacity in degree programmes in priority disciplines and to develop options for self-generating income, MU is planning to use part of the funds to establish ICT Complex and Innovation Incubation Centre, Cafeteria, Academic Complex, Composting facility, External works to connect newly constructed buildings, Reservoir tanks with capacity of 600000L and Rehabilitation of existing water supply system. These buildings will be constructed within MU premises. It should be noted further that according to the World Bank Environmental and Social Framework with Environmental and Social Standards (ESS), and Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations 2018, before undertaking these activities project developers are required to carry out an Environmental and Social Impact Assessment (ESIA) prior to project implementation.

The World Bank Environmental and Social Frameworks (ESF) and Standards (ESSs) as well as the Environmental Management Act of 2004 of Tanzania require project developers to carry out an Environmental and Social Impact assessment (ESIA) prior to project implementation. Through

a rigorous ESIA, potential environmental and social impacts will be thoroughly evaluated, and necessary measures will be recommended to ensure the continued harmony between academic growth, infrastructure development, and environmental preservation. Therefore, this study was done in line with Environmental Management Act, Cap 191, the Environmental Impact Assessment and Audit (Amendment) Regulations, 2018, and the World Bank Environment and Social Framework (ESF) as well as the project's Environmental and Social Management Framework (ESMF). In addition, this ESIA has been guided by the Project Appraisal Document (PAD) and Project Operational Manual (POM) both of 2021.

1.2 Rationale and Objective of the HEET Project

1.2.1 Objective of the MU HEET Project

The primary objective of the project is to enhance MU learning environments and align its programs with the labor market through the implementation of the Higher Education for Economic Transformation (HEET) initiative, funded by the World Bank. Specifically, the MU HEET project aims to achieve the following strategic focus areas;

a. To establish five facilities (ICT Complex and Innovation Incubation Centre, Cafeteria, Academic Complex, Composting facility, Reservoir tanks and rehabilitation of existing water supply system);
b. Expand MU capacity to admit more students in priority disciplines, addressing the growing demand for higher education in these fields.
c. Enhance the quality of education by investing in state-of-the-art learning resources and equipment, ensuring a modern and effective learning environment.
d. Foster a culture of applied research and innovation, aligning academic activities with practical applications to contribute to economic transformation.
e. Strengthen collaboration between MU and the private sector/industry, promoting mutual benefits and relevance of academic programs to real-world needs.
f. Integrate advanced digital technologies into academic processes to modernize teaching methods, research, and overall university management.
g. Develop sustainable options for self-generated income to reduce dependence on external funding sources and enhance financial stability.
h. Invest in the professional development of academic staff and university leadership to ensure high-quality education and effective management.

1.2.2 Rationale of the project

In recent years, Tanzania has achieved notable progress in basic education. One notable example is the significant rise in primary level enrollment, which increased by 24.5% from 8,116,488 pupils in 2015 to 10,111,671 pupils in 2018 (10,601,616 in 2019). The positive trend in secondary education enrollment during the 2013/2014 academic year also indicated an increase in students transitioning to post-primary education. While the country has witnessed expansion in basic education, policymakers widely recognize that the successful performance at this level leads to a heightened demand for subsequent education levels, particularly higher education.

Despite the advancements, a major challenge lies in the education system's incapacity to absorb the growing number of graduates from basic education who are both inspired and capable of pursuing higher education. The pressing need is to enhance investment in infrastructure, facilities, and quality assurance systems, particularly in fields such as Engineering (Railway, Hydropower, Aeronautic, etc.), Medical Science and Technology, Agriculture and Allied Sciences, Energy and Minerals, Forestry, and Natural Resource Management. To address these challenges, the Higher Education for Economic Transformation (HEET) project aims to provide funding for the development of infrastructure, faculties, and quality assurance systems in higher education. The goal is to facilitate swift economic transformation in the country. Through the HEET project, the Government of the United Republic of Tanzania aims to strengthen the operational capacities of public universities, empowering them to become reliable drivers of economic transformation. This involves building upon their respective institutional visions, missions, objectives, and core values.

1.3 Objectives of ESIA Study

The objective of the ESIA study is to ensure that environmental concerns are integrated in all the project activities in order to contribute to sustainable development. The specific objectives of conducting the Environment and Social Impact Assessment study with respect to the project was:

a. To carry out environmental screening and scooping study to identify social and environmental risks and impacts in the project site and nearby environment;
b. To identify, analyse and assess environmental and social risks and impacts of the proposed establishment;
c. To describe the pertinent regulations and standards governing; environmental quality, health and safety, protection of sensitive areas, protections of endangered species and land use control at international, national regional and local levels.
d. To ensure that the project comply with key relevant policy, legal and institutional frameworks and compliance of Environmental and Social Standards
e. To recommend cost-effective measures for minimizing or eliminating adverse impacts of the proposed design, construction, operation and maintenance of the project;
f. To prepare Environmental and Social Management Plan (ESMP), including Health and Safety Management for design, construction, operation and maintenance phases of the Project.
g. To identify key stakeholders, the roles and responsibilities of the project implementation entity, implementing agencies and other stakeholders, legislative and regulatory requirements for the implementation of the ESMP.
h. To inform statutory and public stakeholders about the potential impacts as well as risks and opportunities of the project and about the proposed mitigation measures.

1.4 Methodology and ESIA Team

The ESIA study applied different participatory methods to involve all the concerned stakeholders. The methodology used in this study is commensurate with the Environmental Management Act, Cap 191 and the Environment Impact Assessment and Audit (Amendment) Regulations, 2018).

A multi-disciplinary team of experienced scientists and environmental professionals was assembled to carry out the required resource assessment, generation of baseline data, determination of potential impacts and recommendation of mitigation measures. These include: EIA Expert (Team Leader), Environmental Engineer, Civil Engineer, Sociologist & GBV Specialist, Biodiversity expert, Occupational Health and Safety Specialist and GIS experts, Municipal and Civil services engineer who worked in close collaboration with the relevant stakeholders in Mvomero district council, and Mzumbe ward officials. An interactive approach was adopted among the environmental team members and other project professionals. The team utilized the checklist for data gathering, analysis, and presentation. The team members conducted the reconnaissance investigations to determine the critical elements for analysis and the issues highlighted for the design and planning process. Team meetings were held to discuss the progress of investigations and analyses and facilitate data integration toward an understanding of the systems at work in both the natural and built environment. Baseline data for the study area were collected using a combination of:

i) Site Reconnaissance
ii) Analysis of Maps and Plans
iii) Review of Reports and background documents
iv) Checklists
v) Field Studies
vi) Public Consultations

1.4.1 Desk Study

The ESIA study applied different participatory methods to involve all the concerned stakeholders. The methodology used in this study is commensurate with the Environmental Management Act, Cap 191 and the Environment Impact Assessment and Audit (Amendment) Regulations, 2018. The study was undertaken based on checklists complimented by the Consultants' experience and through discussion with MU staffs, local government officials and communities in the vicinity of the project area. The scoping study was done both as a desktop study and fieldwork. It involved the review of literature/documents on HEET Environmental and Social Management Framework (ESMF) as well as Project Appraisal Document (PAD) and Project Operational Manual (POM) all of 2021. ESMF (2021). and the World Bank Environmental and Social Standards on Assessment and Management of Environmental and Social Risks and Impacts (ESS1) were fully incorporated in this ESIA. According to ESS1, ESIA is an instrument to identify and assess the potential environmental impacts of a proposed project, evaluate alternative.

Stakeholders' engagement involved development of a systematic approach to develop good relationships and gather their views on issues that could affect them. It also intended to provide stakeholders with a mechanisms through which to raise grievances. Other issues involved review of Mvomero socio-economic profile, district development plans and field studies at the project site. This aimed at gathering information and data on various aspects of the project.

1.4.2 Site visits

This involved undertaking systematic assessments within and around the proposed establishment. All observations were analyzed and documented. Furthermore, experts' observations and technical methods related to the issues in question were explored as detailed in this report. To get wide scope of the existing situation on the site, appraisal was made on physical and environmental conditions of the proposed establishment and areas that may be impacted by the project, including land use and drainage system as well as assessment of other relevant socio-economic parameters.

1.4.3 Stakeholder Engagement

Identification of stakeholders

The stakeholders were identified based on their roles, relevance, and potential to be impacted or to impact the project. Most of the stakeholders that might be impacted by the project, e.g., nearby developments, local government authorities, Government Departments, Parastatal Organisation and MU, were pre-determined. discussion, were conducted. The consulted stakeholders include:

- MU Staff both Academic and Administrative.
- MU Students.
- MU Gender unit.
- MU Service providers.
- Mzumbe ward officials
- Mzumbe village (Changarawe, Vikenge and Tangeni village).
- Mvomero District Council.
- Occupational Safety and Health Authority (OSHA).
- Wami/Ruvu Basin Water Board.
- MORUWASA
- RUWASA
- NGOs and CBOs

In contrast, others were identified by different stakeholders, including the Proponent. Some of the stakeholders unfolded as consultations went along, e.g., groups and individuals on and in the vicinity of the project area.

Involvement of stakeholders

The study team, in collaboration with the project proponent representative visited the proposed project area and neighboring community. Physical observations and stakeholder interviews were conducted to collect baseline data and issues of concern. The study applied different participatory methods to involve all relevant stakeholders. The interview with individuals is based on a list of available contents or questions and discussions. Focused group discussions were also used to

gather information. In establishing the public's views concerning the proposed project, the consultants were provided with an introduction letter addressed to each stakeholder, briefing the project and asking them to raise their concerns to consultant freely.

Documentation of stakeholders' concerns

The stakeholders pointed out several issues and concerns. An individual or a group of people who raised an issue was cross-checked by discussing it with other groups. Key issues raised by each stakeholder group were summarized and further analysed in this report. For details of stakeholders consulted, the record of main issues raised (comments) and responses, see Chapter 5.

1.4.4 Baseline Data and Information

1.4.4.1 Environment

Information was gathered on the existing physical environment, particularly as related to topography, soils, drainage and hydrology in general.

Climate, soils and topography,

Information on the climate, geology, topography, soils, was obtained by compiling data from existing reports, and source agencies. Maps were also examined to obtain some of the data such as topography of the general area. Field work was carried out to augment and verify existing information relating to topography and soils and to obtain first-hand knowledge of the other physical aspects.

Hydrology and drainage

Surface and ground water characteristics were assessed using field investigation as well as maps and data from previous reports.

Noise and Vibration

Spot measurements were done on site to determine the current noise levels and vibration at the project site. Sound level meter device was used to record noise at the four corners of the project site (north, south, east and west) as prescribed in ISO 19961:2003 and ISO 3095:2001. On taking measurements, the meter was set to the "A" weighed measurement scale, which enables the meter to respond in the same manner as the human ear. The meter was held approximately 1.5 m above the ground and at least 0.5 m away from hard reflecting surfaces such as walls.

Ground vibrations were measured using a vibrometer data logger, which is designed to measure ground vibrations according to European standard EN 14253:2003. The meter has an accuracy of ±5%, acceleration of 200 m/S^2, a wide frequency range of 10 Hz to 1 kHz for capturing almost all possible ground vibrations. On taking measurements, the accelerometer transducer was mounted on the ground to record both ambient and peak vibrations. To produce accurate results, the transducer was secured in direct contact with the ground. The same point used for noise measurements were also used for vibration.

Air quality

Spot measurements were done on site to determine the current ambient air quality in terms of particulate matter and pollutant gases at the project site. Particulate matters were measured at site in terms of TSP, $PM_{10,}$ $PM_{2.5}$ by using Dust Monitor, that measures dust particles of different dimensions (microns of 10, 5.0, 2.5, <1.0, 0.3 and >10). The equipment complies with the EMC Directives. Ambient pollutant gas concentrations (i.e. CO, NOx, NO_2, SO_2, H_2S, and VOC) were measured using gas analyzer. The ambient gases were measured in accordance with the manufacturer's procedure that meets ISO 9001:2008 protocol. The device was elevated at a height of 1.5 meters above the ground; once the device is switched ON, it performs an automatic calibration for three minutes by pumping in fresh air into the sensors so as set the toxic sensors to zero.

1.4.4.2 Biological Environment

The status of the flora and fauna of the study area was determined by a review of literature relevant to the area and field investigations. The vegetative communities were identified and classified into community types. Identification was carried out of dominant tree species. The vegetation was identified and described for their property. Information on fauna was gathered from existing literature on reported species as well as observations in the field. Observations were made particularly to assess the presence of birds in the general area. Information also was obtained from locals in the area about the presence of any significant species.

1.4.4.3 Socio-economic Environment

To determine the cultural and social factors associated with the construction and operation of the proposed project, members of the communities in the general vicinity of the project were interviewed and a review of economic and social literature was conducted. Further, rapid field appraisal techniques in conjunction with desk research were employed to investigations of the socio-economic considerations within the project area. These were undertaken to ascertain information to satisfy the following factors as outlined in the approved terms of reference provided:

i) Population and settlement characteristics
ii) Land uses and livelihoods
iii) Community structure, employment and income
iv) Developments underway
v) Infrastructure in place
vi) Water supply and other utilities
vii) Waste management practices
viii) Recreational activities
ix) Energy supply
x) Public health and safety

xi) Access to and delivery of health, education and social services

1.5 Review of project documents and literature

This involved reviewing available information on the project to gain a basic understanding of the components and their operation. The documents consulted are presented in the list of references and bibliography of this report.

1.6 Policy, Legal and Institutional Arrangement

Policy, legal and institutional arrangement were compiled from review of documents: policies, legislation, guidelines and standards. Information and data on local by-laws, institutional structures and mandates/authority were obtained from Mvomero District Council.

1.7 Report Structure

The report is presented in accordance with the format given in Section 18 (1 and 2) of the Environmental Impact Assessment and Audit Regulations, 2005. This report is structured in the following style:-

i. Executive Summary
ii. Table of Contents
iii. List of Acronyms

1. Introduction
2. Project description;
3. Policy, Legal and Institutional Framework
4. Baseline Environmental and Social condition
5. Stakeholder Engagement Plan and Grievances Redress Mechanism
6. Impacts Assessment, Mitigation Measures And Project Alternative
7. Environmental and Social Management Plan
8. Environmental and Social Monitoring Plan
9. Cost Benefit Analysis
10. Decommissioning Plan
11. Conclusions

CHAPTER 2: PROJECT DESCRIPTION

2.1 Location and Accessibility

2.1.1 Location

The proposed establishment located within MU, Main Campus on Plot No. Block at Mzumbe Mtaa, Mzumbe ward, Mvomero District in Morogoro Region. At the national setting, MU is located in Morogoro Region. It is connected to the national/trunk road network that links MU to the rest of the country and makes it accessible at the national level through the Old Morogoro - Iringa Road. Figure 1 explains location and accessibility of MU at the national level. At the regional setting, MU is located about 6.2 km from Morogoro Municipality along the Old Morogoro - Iringa Road. Furthermore, the Mzumbe – Morogoro Road which is tarmac road connects the Old Iringa Road and the New Iringa Road. Therefore, MU is accessible from Morogoro town through either the Old Morogoro – Iringa Road or through the New Morogoro – Iringa Road via Mzumbe - Morogoro Road.

Table 2.1; GPS Coordinate of the project area

S/N	Point	Latitude (S)	Longitude (E)
1	ICT Complex and Innovation Incubation Centre	-6.930008	37.55675
2	Cafeteria	-6.936051	37.557616
3	Academic Complex	-6.93141	37.557750
4	Composting facility	-6.923993	37.556515
5	Reservoir tanks and Rehabilitation of existing water supply system	-6.936589	37.570977

2.1.2 Accessibility

As regards to accessibility, the project site is along the earth road (Mzumbe road) at a distance of 1km on the left side as one drives from Morogoro Municipal centre to Mzumbe/Mlali through the Mzumbe - Morogoro Road.

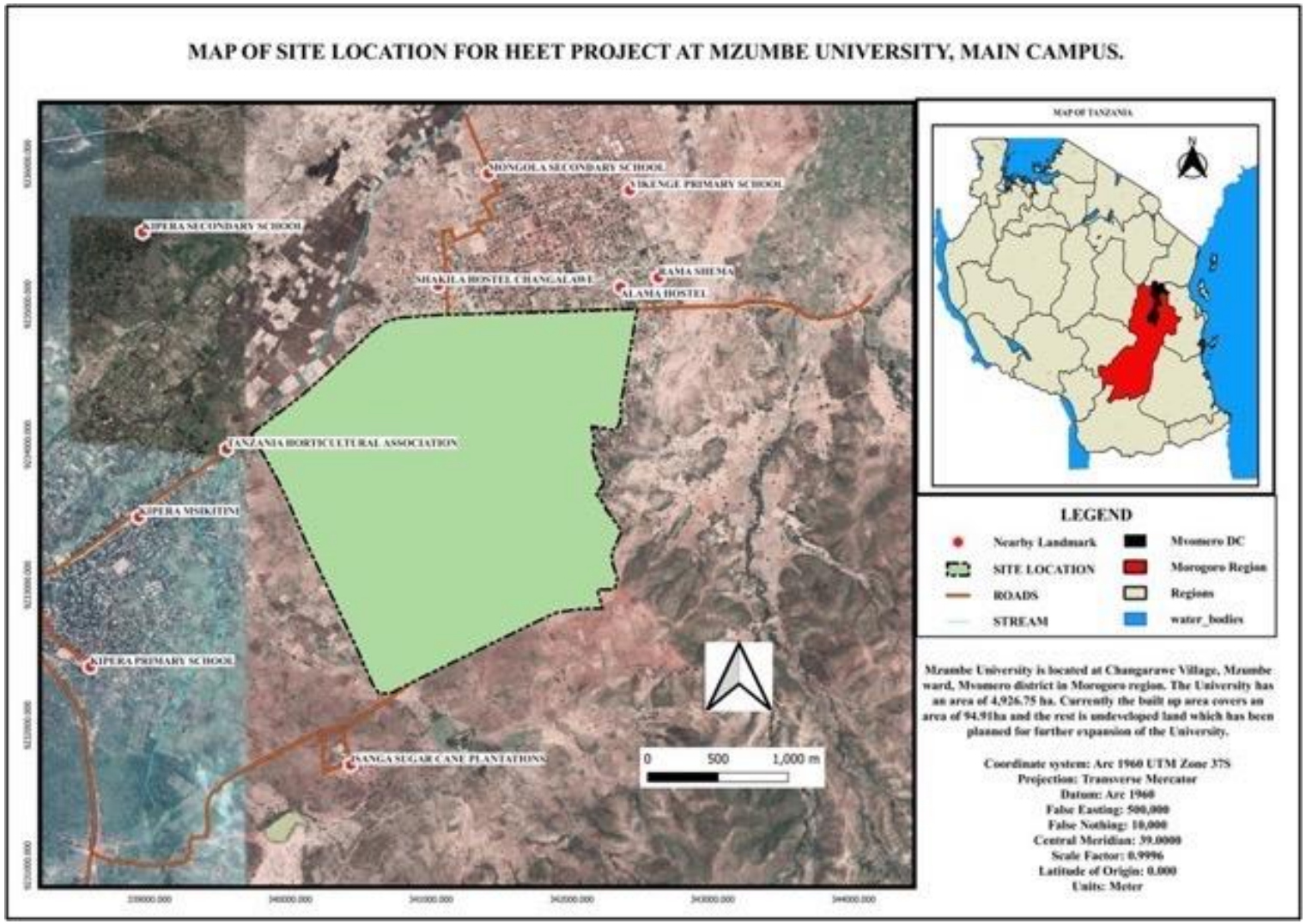


Figure 2.1: Map display MU location at regional level (Source: 3Es 2023)

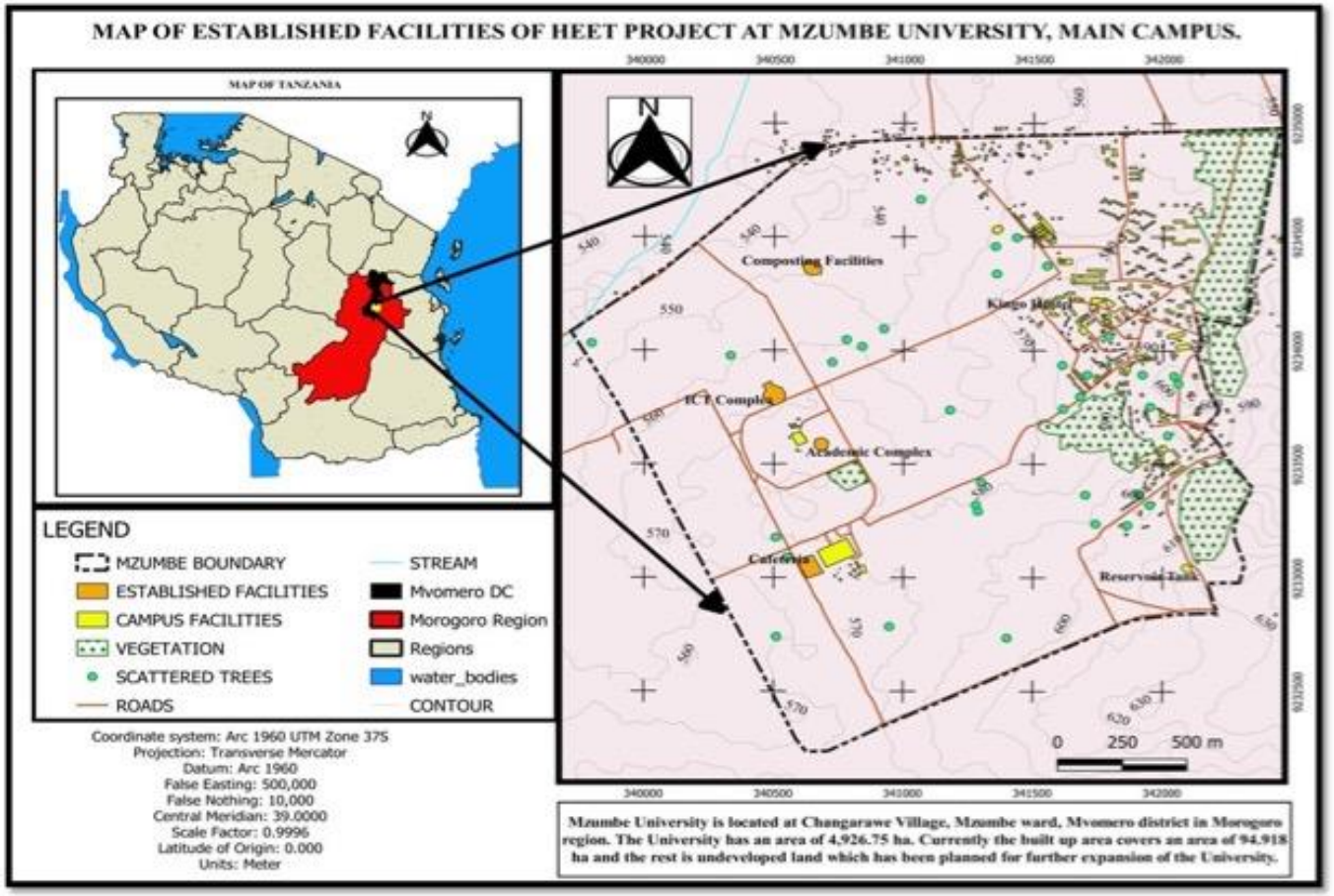


Figure 2.2: Map display proposed project within MU-Main campus (Source: 3Es 2023)

2.1.3 Site Description

The project site is within the area characterized by sandy clay loams and sandy clay soils, different vegetation i.e. (short and long grasses), tree species, and planted tree species cover the surface land. No sensitive ecological sites are found near the proposed sites. The general area is characterized by flat alluvial plains with homogenous sedimentation pattern and the specific area has a largely flat topography and gentle slope. About three quarter of total land at MU constitutes undeveloped land. This land lies to the west of the built-up area stretching from students' halls of residence and hostels. This undeveloped land currently used for farming activities and is suitable for construction of all kinds of development required in spatial expansion of MU. Hence, the proposed construction under HEET project will be done at the least developed area.

2.1.4 Major Adjacent developments

The University overlooks the evergreen scenic Uluguru mountain ranges on the eastern side while on the south it shares a common boundary with Mzumbe Secondary School. The University has an area of 985.35 Acres. Currently the built-up area covers an area of 234.55 Acres and the rest is undeveloped land which has been planned for further expansion of the University. Figure 1.1 above explains location and accessibility of MU at the regional level.

2.2 Project Scope and Activities

The proposed project shall deal with establishment of ICT Complex and Innovation Incubation Centre, Cafeteria, Academic Complex, Composting Facility, Reservoir Tanks, and the Rehabilitation of the existing water supply system within the university.

2.2.1 Description of site for Proposed establishment

Site 1: ICT Complex and Innovation Incubation Centre

The building will be of 4-Storey and it will consist of boardroom for 50 people, Mini- library for 40 people, Multimedia educational resources labs for 100 people, video and audio-conferencing room for 100 people, offices for 60 staff, internet facilities for 50 people and training lab for 200 people and additional spaces for innovation incubation centre. The estimated net floor area is 2638sqm.This site is located Maekani area, near to the existing buildings for School of Law. Within the site there is no any trees that were found, only grasses, crops and small shrubs were observed (Plate 2.1). The total number of each components will be stated when design is completed and the components will be described based on storey.

Site 2: Cafeteria

Ground building with a sitting capacity of 900 people will be constructed for cafeteria use. The building will consist of cooking area, food preparation area, washing area (utensils, selling counter, Dining Hall, Food store (cold and dry), general store, washrooms and changing rooms, cashiers' office, corridor/circulation. This site is located at Maekani area within MU, Main campus opposite to existing Hostels that are used by School of Law Students. There are existing TANESCO power lines within the proposed site that will be removed during construction. The site for the proposed establishment is only covered by grasses.

Site 3: Academic Complex

This building will be of 4 storey and it will consist of with offices for 100 staffs, classrooms and lecture theatre for 1000 students will be constructed. Also, the building will consist of main entrance area, Staircase, passage, toilets, two raised classrooms each to accommodate 200 students, two raised sitting lecture Theatres each to accommodate 300 students, common room and pantry, meeting room, lactation room/private space (for breastfeeding), Special education resource centre, one executive office complete with secretary's office and toilet, nine offices for senior staff, twenty five offices for junior staff-Type 1 (sharing rooms@2 Staff), two offices for Juniour Staff-Type 2 (sharing rooms @5 Staff), ICT cum server room, storage room. The total estimated floor area is 3425sqm. This building will be constructed at Maekani between the existing School of Law classrooms and the administration building which is currently under construction. Only a few grasses were observed at the site. The total number of each components will be stated when design is completed.

Site 4: Composting facility

This will involve construction of solid waste dumping site called composting facility with an area of 854sqm. Composting sites will be used for the controlling decomposition of organic waste such as food remain from cafeteria, yard trimmings and other sources within campus. This composting facility will facilitate the natural breakdown of organic matter into nutrient-rich compost, which later on will be used as a soil amendment. Properly managed composting facilities will minimize odours and prevent the release of greenhouse gases.

Site 5: Reservoir tanks and rehabilitation of existing water supply system

MU aims to expand its campus infrastructure to accommodate the growing academic needs. To support this expansion, MU plans to establish four additional reservoir tanks, each with a 600,000-liter capacity, adjacent to the existing reservoir tank. Currently, the university has two reservoir tanks with each with a capacity of 540,000 liters. This expansion is essential to ensure a reliable and sufficient water supply for the new facilities, including the academic complex, ICT Complex, Innovation Incubation Centre, and cafeteria. By increasing the water storage capacity, MU is proactively addressing the increased demand for water resources that will result from its campus expansion, ensuring the uninterrupted operation of these critical facilities.

Rehabilitation will involve the intake from Tangeni River at Tangeni village to MU in changarawe village. The activities to be involved will includes clearance of the existing network, excavation and changing of broken pipes. No tree clearance will be done at the intake.

2.3 Establishment of Road Network and Parking external works to connect newly constructed buildings

The road network and parking consists of local distributor roads, access roads, pedestrian walkways and parking spaces. The road network have been linked with the existing roads of which the main entrance are proposed to be two, the main entrance, which is the new entrance to the

campus, and the minor entrance, which is existing. Those road will be connected into proposed establishment of new buildings under HEET project.

2.4 Project design considerations

The overall design of the buildings will promote use of construction materials, which are environmentally friendly, durable, and vandal-proof and those, which require minimal periodic maintenance. The buildings friendly to gender equality including considerations to persons with special needs (e.g., physical, learning impairment, emotional and behavioral). The general design considerations will incorporate aspects of modern architecture, the current local government building policy guidelines and the latest standards developed by (Contractor Registration Board) CRB and the Tanzania Commission of Universities (TCU) Architectural Metric Handbook which will include;

a) **Sanitary appliance:** The number of toilets and wash hand basins will be selected according to the number of students, workers and disabled who will be using these facilities. The total number of toilets at the proposed establishement will be stated after project design.

b) **Waste water management:** Waste water will be connected to the existing sewer system (Wastewater stabilisation pond) at MU with capacity of 7,740m^3/day and the proposed one with the same capacity which will be established in order to accommodate and manage all wastewater generated at MU.

c) **Functionality and Space planning:** Contractor should collaborate with stakeholders to understand the specific needs and requirements of each building. Also, the design should cater for natural ventilation with features that encourage natural air circulation (including use of permanent air vents above all doors and windows). In addition to that, the design caters for various types of energy efficient luminaries including fluorescent lamps and natural lighting through glass windows and doors as appropriate for both security and lighting.

d) **Sustainable resource use:** The design of the buildings will incorporate landscaped gardens which will be planted with suitable species of trees / shrubs and grass to prevent ecological deterioration and improve aesthetic value of the site. Part of the excavated soil will be used for landscaping therefore reducing the amount of soil to be transported away from the site. Also contractor should select materials with low environmental impact, such as recycled content, low VOC (Volatile Organic Compounds), and sustainably sourced wood.

e) **Solid waste management:** Contractor will be responsible for the management of generated solid waste. However during operation phase MU will manage their solid waste especially biodegradable waste through the proposed compositing facility and will ensure proper waste segregation and composting processes.

f) **Security and Safety issues:** Contractor should comply with local building codes and regulations to ensure the structural integrity of the building, conduct thorough risk assessments to identify potential hazards and vulnerabilities, incorporate earthquake-resistant designs and materials to withstand seismic activity in susceptible regions,

implement fire-resistant materials and systems to enhance building safety. Additionally, evacuation plans and emergency exits must be well-planned to facilitate safe and swift evacuation during emergencies. Also, implementing robust security systems, including access control and surveillance.

g) **Durable and Vandal-Proof Materials:** Contractor should consider using materials like concrete, brick, or metal cladding for durability and resistance to vandalism in external parts. And in Flooring should opt for materials like terrazzo, polished concrete, or durable commercial-grade carpeting. Also, in windows and doors contractor should use impact-resistant glass and robust door hardware.Wall finishes: Consider using graffiti-resistant coatings or easily cleanable surfaces.Furniture and fixtures: Choose sturdy and tamper-resistant furniture and fixtures for common areas.

h) **Disaster issues:** Contractor should develop buildings with disaster-resilient features, such as earthquake-resistant foundations and reinforced structures to withstand potential natural disasters. Also, establish emergency evacuation plans, implement clear and accessible evacuation plans, ensuring all occupants can safely exit the building in case of emergencies.

i) **Climate Change Adaptation:** The building design should prioritize energy efficiency and sustainable materials to minimize its carbon footprint. Adequate insulation and natural ventilation systems can help regulate indoor temperatures, reducing reliance on energy-intensive cooling or heating. Rainwater harvesting systems can also be implemented to mitigate water scarcity during dry periods.

j) **Inclusivity and Accessibility:** The building should be designed to cater to the needs of all users, including people with disabilities and elderly individuals. Adopting universal design principles ensures that the building is accessible, user-friendly, and promotes equal opportunities for everyone. This includes barrier-free entrances, accessible restrooms, and consideration of diverse mobility needs.

k) Replacement of planting trees that would be knocked down during construction.

2.5 Project Activities

Activities for the project shall be implemented in four phases namely planning, construction, demobilisation, and operation and maintenance phases. Details of each of the phases are provided in the sections that follow;

2.5.1 Mobilisation Phase

Planning phase for the project commenced in April 2023 and will be concluded in 2024. Activities during mobilisation phase will include:

a. Topographical Survey

A thorough examination of the natural and artificial characteristics of a specific area, known as a topographical survey, involves detailed mapping. This survey yields precise elevation information, often depicted through contour lines, revealing the land contours and inclines. This data is essential for construction endeavors, ensuring adequate drainage, appropriate grading, overall site suitability, and environmental awareness.

Surveyors conducted a topographical survey for upcoming projects to define boundaries and ground levels accurately. This process ensures compliance with property limits and aids in identifying and addressing potential environmental and social impacts highlighted in the ESIA report.

b. Geotechnical investigations

The examination of the proposed facilities to be established at MU-Main campus involved conducting a geotechnical investigation through excavation trial pits and in-situ testing with for each building. This investigation is crucial for evaluating the subsurface conditions in the project area and guaranteeing the structural integrity, stability, and safety of the intended construction. By analyzing soil and rock properties, groundwater conditions, and potential geohazards, the geotechnical investigation offers valuable insights for designing foundations capable of withstanding the specific geological challenges at the location. The acquired data assists in optimizing construction techniques, mitigating risks, and ensuring the durability and resilience of the proposed structures. Essentially, a comprehensive geotechnical investigation is an essential step in the pre-construction phase, significantly contributing to the overall success and sustainability of the planned building.

c. Architectural and Services Designs

The functionality and efficiency of a building are influenced by its architectural and structural designs, ensuring alignment with its intended purpose. Carefully planned architectural blueprints contribute to creating a conducive and purposeful environment, particularly for headquarters buildings. Additionally, the structural designs play a crucial role in guaranteeing the safety and long-term durability of the structure. Adequate engineering and structural considerations are indispensable to withstand environmental elements, natural disasters, and the passage of time.

d. Acquisition of various permits/ certificates

The procurement of different permits and certificates required for the planned project relies on the Environmental and Social Impact Assessment (ESIA) conducted at MU-Main campus. This encompasses obtaining certifications such as the ESIA certificate, building permit, land use permit, water resource use permit, waste management permit, Fire and Rescue certificate, and occupational health and safety certificate

2.5.1.1 Sourcing of materials

Based on the location of the project site, most of construction materials shall be sourced from Morogoro and outside Morogoro Region. Greater emphasis will be laid on procurement of building materials from within the local area as highlighted in the table 2.2, which will make both economic and environmental sense as it will reduce negative impacts of transportation of the materials to the project site through reduced distance of travel by the materials transport vehicles.

Table 2.2: List of material requirement

Requirement	Type	Source	Quantity (Estimated)	Mode of Transport
Building materials	Gravel	Lugoba in Pwani region		Trucks
	Sand	Sangasanga Pit		Trucks
	Cement	Twiga cement in Dar es Salaam		Trucks
	Concrete brocks	Morogoro		Trucks
	Water	Tangeni river		Trucks
	Timber	To be sourced from authorized local dealers in		Trucks
Energy	Electricity	TANESCO (National Grid) proximity to the site		
		Generator will be used in case of power outage		
Equipment/ Machines	Bull Dozers	Contractor	1	Trucks
	Graders		1	Trucks
	Trucks /Tippers/lorries		1	
	Concrete mixers		1	Trucks
	Compactor		1	Trucks
	Excavator		1	Trucks
	Front end loader		1	Trucks
Manpower	Skilled	Contractor		Communal buses/Company cars
	Unskilled	Local people near project site		Communal buses

NB; Quantity of raw materials and exact source of raw material will be estimated and determined after BOQ.

2.5.1.2 Transportation of materials

The contractor will be responsible for the transportation of all construction materials and equipment from point of sourcing to the site mainly by using Mzumbe - Morogoro roads. The Community Health and Safety (ESS4) Environmental and Social Standards must be considered when transporting materials.

2.5.2 Construction Phase

The proponent will contract private construction company to construct the project site. The contactor will be responsible for sourcing of materials, labor recruitment and actual construction work. The duration of this phase will be **18 months**.

2.5.2.1 Consideration for constructing different structures

Different considerations will be given when constructing different project structures. These will aim to provide stability and durability of the structures. Some of the considerations are discussed in the sections that follow.

a) Founding conditions

The proposed establishment of new building facilities at MU will require foundation on a good and uniform soil to avoid deferential settlement. A full geotechnical investigation shall be

conducted to ascertain the exact founding conditions of the building's structures. Currently, geotechnical study were not conducted.

b) Durability of the concrete

Durability of any concrete is dependent on the cement being used, aggregates, admixtures, concrete mix design and curing. Rapid hardening cements will be avoided due to greater evolution of heat which can lead to increased shrinkage cracking.

2.5.2.2 Construction Activities

Activities during construction phase will be including site preparation, materials transportation, material storage, construction of buildings, construction equipment and construction materials.

a. Site preparation

Activities under site preparation will include land clearing, grading and excavation, construction of auxiliary structures such as access roads etc., leveling and earth marking. The proponent should ensure as many indigenous trees as possible are left intact. This will also ensure that the drainage pattern of the site is not interfered with.

b. Material transportation

Materials will be sourced in a manner that promotes the efficient utilisation of resources, as specified in ESS3. This involves the transportation of materials, including fine and coarse aggregates from quarries to the construction site via trucks. Water will be delivered to the site using tanker trucks from contractor, while other materials such as cement, timber, and reinforcement bars will also be trucked to the construction site.

c. Construction of worker's camp

The awarded contractor will construct a workers' camp within the project area in Changarawe village. This facility will serve as housing for 50 workers and also function as storage space for various construction materials and equipment, as well as a workshop for servicing construction machinery. However, it's important to note that not all workers engaged in the project will be accommodated in this camp. The majority of workers, including unskilled and semiskilled laborers, will be recruited from Mzumbe ward, both of which are in close proximity to the proposed project site.

d. Mansory, concrete works and other related activities

The project will encompass various construction elements, including building walls, foundations, floors, pavements, drainage systems, perimeter fencing, and parking areas. A significant portion of the project will focus on masonry work and its associated tasks. This encompasses activities such as shaping stones, mixing concrete, applying plaster, pouring a concrete slab, building foundations, and curing newly poured concrete surfaces installation of plumbing workers, putting a wall frame, roofing and finishing. These tasks are recognized for their labor-intensive nature and will be supported by machinery, including concrete mixers, to enhance efficiency.

e. Electrical works

Throughout the construction of the premises, the electrical tasks will encompass the installation of various electrical devices and equipment, which includes electrical wiring, lighting fixtures,

sockets, and more. Furthermore, there will be other processes that require electricity, such as welding and metal cutting.

f. Plumbing

Piping for water supply and distribution will be installed throughout all units and related facilities. Moreover, a separate set of pipes will be laid to connect the premises' sewage system to the proposed WSP.

g. Steel structure works

The stability of the buildings will be enhanced through the use of structural steel. The works related to structural steel will include cutting, welding, and erecting the steel components.

h. Roofing and sheet metal works

The roofing tasks will encompass cutting sheet metal, lifting the roofing sheets and structural timber to the roof, and securing the roofing materials onto the roof.

i. Landscaping

In order to enhance the site's visual appeal once construction is completed, the proponent plans to conduct landscaping activities. This will encompass the creation of flower gardens and well-maintained grass lawns where suitable, and will also entail the restoration of topsoil. Importantly, the proponent intends to utilize locally available plant species, preferably indigenous ones, for the landscaping process.

2.5.3 Demobilisation Phase

The main activities to be undertaken during the demobilisation phase shall include the demolition of the storage facility/camp site. Rubble from construction activities, demolished storage facilities, and other waste from construction activities will used as fillers during foundations. Any leftover solid materials are likely to be composed of bricks, and crumbles of cement will be disposed by levelling off other degraded areas within the project area and within the surrounding communities. Demobilization will further involve laying off construction workers, removal of construction equipment and leftover materials, dismantling of workers' camp and levelling the site, landscaping, and filling of borrow pits. Demobilisation phase will last for a period of two 1-3 months.

2.5.4 Operation and Maintenance Phase

Activities during operation and maintenance phase will include commissioning the use and regular maintenance of these new premises. During this phase different wastes both solid and liquid waste will be generated within the same period, which will need proper management. The activities that are expected to be done during the operation phase will include

- Daily teaching and training operations
- Utilisation of cafeteria for food services
- Management, maintenance and operation of waste water treatment plant Management, maintenance and operation of solid waste dump site.
- Maintenance of water supply facilities

The proposed development will also comprise of several student activities such as cooking, washing, leisure and recreational activities will thus accompany residence.

2.5.5 Decommissioning Phase

Decommissioning occurs when a project reaches its conclusion. However, currently there is no fixed timeframe setting for decommissioning of the proposed establishment, eventually, when the project reaches its end, all the facility and related infrastructure will be dismantled. This process will include the removal and demolition of buildings and equipment used, or even the complete demolition of the entire area, followed by the clearance of the site and transportation of all waste and debris to a disposal site. Subsequently, site restoration efforts will be undertaken to ensure that the area reverts to its original condition as it existed prior to the construction of the proposed buildings.

2.6 Manpower and Utility Requirements

2.6.1 Manpower Requirements

The proposed establishment will temporarily employ about 150 people during construction phase. Employment during construction phase will be under contractor and will be in the form of skilled as well as unskilled laborers considering all gender types. For the semiskilled and unskilled laborers, the contractor will employ people from the nearby communities as a way of making sure that the project becomes beneficial and brings a sense of community ownership.

Also, the Contractor is required to adhere to the provisions of the Employment and Labor Relation Act No. 6 of 2004. Additionally, they must formulate a recruitment and termination strategy aimed at securing the necessary skills locally for the project and ensuring equal opportunities for all. Adherence to the Labor Institution Wage Order (2013) is mandatory, with payment in accordance with prevailing labor laws to prevent conflicts during the construction phase. Draft contracts are to be jointly prepared by the Contractor and the client, subject to approval by the World Bank and the Labor Officer. Furthermore, in order to prevent the use of child labor, the contractor has been provided with the relevant laws outlined in POM 2021.

2.6.2 Energy Supply

MU receives its energy from public institution TANESCO power supply. The supply is sufficient to meet the existing demand. Also the proposed establishments of new buildings will be supplied by TANESCO from the national grid network and on top of that backup generator will be used during emergency. Though the quantity of energy to be used during construction and operation period will be estameted after project design.

2.6.3 Water Supply

The major water source is from Tangeni River which is about 10km from MU-Main campus and boreholes 60 meter deep with capacity of 8,500 liters/hour, water will be used for construction activities and for domestic purpose (flushing of toilets) and cleaning activities during construction and operation phases. It is expected that about 40000 liters per day of water will be used during

construction phase, however the amount of water during operation is not estimated until project design. Also, MU has water use permit for Tangeni river from Wami/Ruvu Basin Water Board.

2.7 Construction Products, by-products and wastes

It is anticipated that the project will generate a variety of products, by-products and wastes during its construction and operational phases. The characteristics of the products, by-products and wastes are discussed in this section

2.7.1 Products

The final product based on this project MU will have enough space and facilities to accommodate and enroll other 2500 student's.

2.7.2 By-Products

The by-products will be disposed-off as follows:

- **Soil;** the soil generated during excavation will be reused elsewhere in the project. Unusable soil will be transported for disposal at designated dumping sites.
- **Pieces of timber/wood;** large pieces of timber/wood generated during the construction phase will be transported back to the contractor 's yard for reuse in future while the small pieces of timber/wood will be disposed-off for use as fuel for cooking and heating.
- **Empty cans and drums**: These will be used to store water during construction. The damaged ones will be disposed-off to registered scrap metal and plastic waste dealers.
- **Excess sand, ballast, and stockpiles:** These can be used for future construction activities for example during future renovations. Upon completion of the project, these will be moved by the contractor to a suitable yard.

2.8 Waste Management

2.8.1 Solid Waste

2.8.1.1 Construction phase

Waste generated on the construction site will include materials like debris, plastic remnants, cans, tins, grass, and packaging waste such as cardboard boxes, wooden drums, and empty cement bags. The presence of construction workers will lead to the generation of domestic waste like food leftovers, plastic bottles, paper, and related materials. The contractor shall allocate a specific zone for the collection of waste, organizing it based on its characteristics.

The effective management of solid waste is essential for maintaining environmental sustainability and adhering to waste management regulations. This responsibility will be entrusted to an authorized contractor, who will oversee the process either through their own facilities or by utilizing local facilities, such as the Masika dumpsite in Morogoro Municipal Council. The proximity of Masika dumpsite to Mzumbe University, approximately 13 kilometers away, makes it a more practical choice compared to the dumping site in Mvomero District, which is located approximately 35 kilometers from the university. Major wastes generation associated with the project construction and their treatment/ disposal methods are described in table 2.3.

Table 2.3: Waste generation and treatment during construction Phase

Activity	Waste type	Amount	Treatment/ Disposal Method(s)
Clearing of top soil	Spoil Soil	Significant	This soil shall be stock piled along the foundation trenches for all structures and backfilled for pipes laying. The soils shall be used to reinstatement site at the end of the project, the spoiled materials shall be disposed to designated disposal sites
Biodegradable solid waste	Food remains	Not Significant	Collected and stored temporary through a dustibin then disposed at Masika dumpsite in Morogoro Municipal Council. These solid wastes are organic in nature and thus proper management is required in time to avoid bad odor if they are not disposed in time
Actual Construction	Rubbles	Not Significant	Will be stockpiled and used to fill cut sections
	Scrap metals	Not Significant	Sell to recyclers
	Timber	Not Significant	Provided to locals for re-use
	Cement bags	Not Significant	Sell to recyclers
	E-Waste	Not Significant	Sell to recyclers

Sampling date: April 2023 **Source: 3Es observation and analysis**

2.8.1.2 Operation phase

Solid wastes generated at MU-Main campus are categorized into institutional solid waste, domestic solid waste and hazardous solid wastes. Institutional solid wastes are mainly paper wastes from offices, halls of residence, cafeteria, and health centre, thus contributing a larger portion of all wastes generated and will treated and managed into open air buring within MU. Domestic solid wastes are generated at the residential areas and cafeteria and will be biodegradable and non-biodegradable solid waste.

Biodegradable solid waste will include vegetation and food remains which will be collected in waste collection points ready for disposal at the designated dumpsite within MU which are open pit dumping and the proposed composting facility that will be established in this project . Non-biodegradable solid waste will include waste like, scrap metals, glasses and plastics which will be collected in waste collection points and should be recommended that to registered contractors or sell to recyclers for proper management of this waste. Also, from female hostels there is generation of sanitary pads which is collected in dustbins and managed through incinerator found in MU health centre. The total amount of solid waste generated is expected to be 24.12tons/day based on generation rates of 0.3kg/day/person and population projection about 80,400 people.

2.8.2 Liquid waste

Liquid waste will be generated at the site from washrooms, kitchen sinks and handwash basins at students hostels, staff residential, health centre, cafeteria, academic and administration building.

The sanitation practices applied in MU-Main campus is a mixture of on-site and off-site sanitation system.

On-site sanitation systems practiced in the campus consists of septic tanks, soak away pits, and pit latrines. Off-site sanitation system through a sewerage network covers some few buildings and will be collected and managed into the existing wastewater stabilisation pond (WSP) which are located within the University and the others which are proposed to be established within the university. Storm water will be managed properly to improve drainage within the development. Other liquid waste generated it includes oil and greases during construction phase.

2.8.2.1 Construction phase

Assuming that;

- There will be 150 people (Worst case scenario)
- Water consumption = 40L/Capital/Day
- 80% of water consumed become waste water.
- 100% of the workers shall use University toilets
- Wastewater generation per day = 150 x 40 x 0.8

Therefore, about 4.8 m^3 per day of liquid waste will be produced from the site during construction period. The wastewater will be collected and treated through soak away pit and the design will accommodate the entire construction period.

2.8.2.2 Operation phase

Assuming that;

- There will be 80,400 people (Population projection) (Worst case scenario)
- Water consumption = 40L/Capital/Day
- 80% of water consumed become waste water.
- 100% of the students and workers shall use University toilets
- Wastewater generation per day = 80,400 x 40 x 0.8

Therefore, about 2,572.8 m^3 per day of liquid waste will be generated from the proposed and existing facilities at MU during Operational phase. The wastewater will be collected and treated through the proposed WSP and the design will accommodate the entire operation period.

2.8.3 Hazardous waste

Hazardous wastes, because of their potential of being harmful to micro- and macro organisms, are generated at areas such as health centre which are treated through MU incinerator. However the main hazardous wastes that will be generated at the site during construction period are electrical equipment, concrete additives, tins, scrap metal etc. This waste will be collected within the designated dustbin then taken to the storage area and finally disposed by an authorized contractor. This practices should be implemented during construction period in order to ensure proper management of generated hazardous wastes.

Also, E-wastes like computers, printers, and tonners will be disposed based on the Environmental Management (Control and Management of Electrical and Electronic Equipment Waste) Regulations of 2021.

2.8.4 Storms water management

At present, all the existing facilities at MU have drainage systems in place. These drains collect stormwater from the catchment areas and channel it towards the receiving environment. The open drain channels are currently in good condition. The upcoming design will incorporate a stormwater management system on-site to handle an increased volume of stormwater. Construction activities are planned during the dry season to avoid complications. Moreover, the drainage system will be constructed to accommodate the expected stormwater generated by the proposed buildings.

2.8.5 Cleaning

The proponent will be responsible for regular washing and cleaning of the pavements and communal areas. Individual tenants will be responsible for washing and cleaning their own premises/ residences. Cleaning operations will involve the use of substantial amounts of water, disinfectants, and detergents.

2.8.6 General repairs and maintenance

The buildings and associated facilities will be repaired and maintained regularly during the operational phase of the project. Such activities will include repair of building walls and floors, repairs and maintenance of electrical gadgets and equipment, repairs of refrigeration equipment, repairs of leaking water pipes, painting, and replacement of worn-out materials among others.

2.9 Occupational Health and Safety (OHS)

2.9.1 OHS During construction phase

MU will work hand in hand with the lead consultant to ensure regular trainings on occupational health and safety are provided to both permanent and casual staff. Further, relevant information on various outbreak and pandemic will be shared including Cholera, COVID-19 and HI/AIDS. During the construction phase, the contractor will provide with adequate protective gears such as helmets, heavy duty gloves, jackets and boots. And also, ensure the right infrastructure is in place e.g., sign boards, first-aid station and also, when necessary, transport in case of emergency evacuation.

The MUSO leadership will provide relevant trainings to students to ensure smooth navigation of their daily to day transportation. The speed limit will be set not exceeding 50km/h but within the designated area shall not exceed 10km/h. The contractors shall ensure all their drivers are aware of the set speed limits to ensure safety within the project area and also, both the entrance and exit areas will be identified and labeled.

Also, it explains the mitigation measures for hazards and risks associated with health and safety which include the following;

2.9.1.1 Slips and falls

- Maintain a clean and organized workplace by promptly cleaning up spills, debris, and clutter.
- Regularly sweep, mop, and vacuum floors to remove dust, dirt, and liquids that can create slip hazards.
- Repair or replace damaged flooring promptly to eliminate tripping hazards.
- Choose flooring materials with appropriate slip resistance for different areas. For example, use non-slip flooring in areas where liquids are commonly present.
- Clearly mark wet floors or areas under maintenance with warning signs and cones to alert workers and visitors.
- Use high-visibility tape or paint to mark steps, ramps, and changes in floor level.
- Ensure adequate lighting in all work areas, including stairwells and hallways, to improve visibility and reduce tripping hazards.
- Provide regular training to employees about slip and fall hazards and the importance of following safety procedures.
- Encourage workers to report hazards promptly so that they can be addressed.
- Maintain walking surfaces, including outdoor walkways and parking lots, to prevent uneven surfaces and tripping hazards.
- Conduct regular workplace inspections to identify and address potential slip and fall hazards promptly.
- Use scaffolds, ladders, and elevated platforms with proper guardrails and fall protection equipment.
- Establish clear evacuation routes and procedures in case of an emergency to prevent panic and rushing that could lead to slips and falls.

2.9.1.2 Working at height

- Erect and dismantle scaffolds according to manufacturer guidelines and industry standards.
- Regularly inspect scaffolding for stability and structural integrity.
- Install safety nets where feasible to catch falling workers or objects.
- Regularly inspect equipment, scaffolding, and other structures for damage, wear, or defects.
- Select the right ladder for the job and ensure it's in good condition.
- Place ladders on stable, level surfaces and secure them to prevent slipping.
- Provide workers with appropriate personal protective equipment (PPE) such as helmets, gloves, and footwear designed for working at heights.
- Train workers on the proper use of fall protection equipment, safe work practices, and emergency procedures.
- Assign a competent supervisor to oversee work at heights and ensure safety procedures are followed.

- Establish effective communication methods between workers at different heights and ground level.

2.9.1.3 Moving machinery

- Install appropriate guards, barriers, and shields on machinery to prevent workers from coming into contact with moving parts.
- Ensure that guards are properly designed, secured, and in place before starting any machine.
- Provide comprehensive training to operators and maintenance personnel on safe machine operation, maintenance procedures, and hazard recognition.
- Conduct regular inspections of machinery to identify worn-out parts, malfunctioning components, or potential hazards.
- Follow manufacturer recommendations for routine maintenance and ensure that machinery is serviced by qualified technicians.
- Conduct thorough risk assessments before implementing new machinery or making changes to existing processes to identify potential hazards.
- Establish a reporting system for near misses, incidents, and safety concerns related to machinery. Investigate these reports and take corrective actions as needed.
- Provide appropriate PPE such as gloves, goggles, helmets, and hearing protection based on the machinery's hazards.

2.9.1.4 Diseases prevention

- Encourage frequent handwashing with soap and water for at least 20 seconds. Provide hand sanitizers in common areas.
- Promote proper respiratory etiquette by covering coughs and sneezes with a tissue or the inside of the elbow.
- Regularly clean and disinfect frequently touched surfaces, such as doorknobs, light switches, shared equipment, and restrooms.
- Maintain good indoor air quality by ensuring proper ventilation and air circulation within the workplace.
- Conduct health screenings, including temperature checks and symptom assessments, for employees and visitors before they enter the workplace.
- Implement safety measures in cafeteria, such as limiting the number of occupants and maintaining physical distancing and good housekeeping.
- Provide education and training to employees about disease prevention, proper hygiene practices, and the importance of adhering to safety protocols.
- Create a comprehensive COVID-19 safety plan tailored to your project, including policies, procedures, and protocols.
- Conduct a thorough risk assessment specific to the construction site.
- Assign a responsible person or team to oversee and enforce COVID-19 safety measures.

- Require all workers to wear appropriate personal protective equipment (PPE), including masks, gloves, and eye protection.
- Set up handwashing stations or hand sanitizing stations at key locations on-site.
- Encourage frequent handwashing and provide hand sanitizer.
- Increase the frequency and thoroughness of cleaning and disinfecting common areas, tools, and equipment.
- Improve ventilation in enclosed spaces to increase air circulation.
- Implement daily health screenings for all workers, subcontractors, and visitors. This may include temperature checks and symptom questionnaires.
- Encourage workers to report symptoms or exposure to COVID-19 immediately.
- Maintain open lines of communication with workers, subcontractors, and stakeholders about COVID-19 developments and safety measures
- Use signage and digital communication methods to remind everyone of safety protocols.

2.9.1.5 Being struck by objects

- Regularly inspect the environment to identify potential hazards related to falling objects.
- Assess the risk associated with each hazard, taking into account factors such as object weight, height, and frequency of exposure.
- Use warning signs, cones, and barricades to alert individuals to the presence of falling object hazards.
- Clearly mark exclusion zones in areas where there's a risk of objects falling.
- Use toe boards on scaffolding and elevated platforms to prevent tools and materials from slipping off.
- Conduct regular inspections of equipment, storage areas, and structures to identify and address potential hazards.
- Ensure that any damaged or deteriorating structures are repaired promptly.
- Keep work areas clean and organized to minimize the risk of tripping over objects or inadvertently causing objects to fall.
- Ensure that objects are stored securely when not in use.
- Use appropriate personal protective equipment (PPE) such as hard hats, safety goggles, and steel-toed boots in areas with falling object hazards.
- Ensure that PPE is in good condition and worn consistently.

2.9.1.6 Over-exertion

- Conduct ergonomic assessments of workstations and tasks to identify potential over-exertion risks.
- Modify workstations and equipment to minimize physical strain and discomfort
- Contractor should train employees on proper lifting techniques, including bending at the knees, keeping the load close to the body, and using leg muscles instead of back muscles.
- Reduce the weight of materials, tools, or equipment when possible.

- Provide mechanical aids such as lifting devices, conveyor belts, or adjustable height workstations to reduce manual lifting and carrying.
- Design workstations and workflows to minimize the need for repetitive or forceful movements.
- Contractor should make a job rotation or task alternation to reduce the repetitive nature of physically demanding tasks and provide rest periods.
- Employees should ensure to maintain good posture while working, which includes sitting or standing with a straight back and avoiding excessive twisting or bending.

2.9.1.7 Ergonomics injuries and illness

- Ensure that workstations are designed with ergonomics in mind, taking into account the user's body size, shape, and tasks.
- Provide adjustable chairs, desks, and computer monitors to accommodate various users and allow for proper positioning.
- Implement stretching and exercise programs tailored to the specific needs of employees to improve flexibility and reduce muscle tension.
- Implement job rotation or task variation to reduce repetitive motions that can lead to overuse injuries.
- Encourage short, frequent breaks to allow employees to rest, stretch, and change positions during the workday.
- Provide ergonomic tools and accessories such as ergonomic keyboards, chairs and footrests to reduce strain on wrists and hands.
- Develop and enforce safe lifting and material handling procedures, including the use of appropriate lifting equipment like dollies or forklifts for heavy objects.
- Conduct regular health screenings and assessments to identify and address ergonomic-related health issues early.
- Offer access to healthcare professionals who can provide guidance on managing and treating ergonomic injuries and illnesses.

2.9.2 OHS During operation phase

All the safety issues will be taken into consideration including the allocation of emergency assemble point; Emergency plans and procedure will be developed to prevent and mitigate the likely consequences of accidents associated with the project (construction). There will be a document that outlined in details the potential accidents/emergencies and how to respond; this document will also explain on how to mitigate environmental hazard. The document will also respond to Occupational Health and Safety hazards related to daily operation e.g., risks of fire explosion. Thus, fire extinguishers of powder foam type and fire horse reel will be place in several strategic point and occasionally serviced.

2.10 Disaster Risk Management

The disaster risk management plan is intending to provide efficient and effective operational procedures that will allow the university to save lives, minimize injuries, protect property, environment and preserve functioning campus in times of natural and man-made/technological hazards. In addition, it can be used to control hazards so as reduce the vulnerability, to reduce the risk and the overall management of disaster risk to the MU community. The plan provides the basic information on the action to be taken during the pre-disaster, the disaster phase (during the event) and post disaster phase. The plan describes the emergency and assigns the responsibilities for various emergency tasks, specifically to WHO does, WHAT, WHEN AND HOW.

2.11 Gender analysis and mainstreaming

The constitution of Tanzania, Act No. 15 of 1984 clearly stipulates equal rights for both men and women and prohibits any form of discrimination based on gender, colour, tribe, religion or station in life. Tanzania has signed and ratified both international and Regional Instruments such as the Elimination of All Forms of Discrimination against Women in 1987; the African Charter on Human and Peoples' Rights on the Rights on Women in Africa in 2005. Currently, Tanzania has achieved gender parity at primary school enrolment rates, this can be attributed by free education policy introduced through the Circular 5 of 2015 which implements the Education and Training Policy of 2014. This circular was responding to strategies of eliminating discrimination based on gender.

In the same context, MU has a deliberate policy to encourage equal employment opportunity for both men and women. The contractor of the project will also align with the policies to ensure equal employment opportunities for both men and women.

2.12 Project Boundaries

Determination of project boundaries refers to an identification of impact zones institutionally, temporal and spatially, within which the project impacts will reach. This process involves determination of the extent impacts that would spread away from the core project site. The following project boundaries have been identified;

2.12.1. Institutional boundaries

Institutional boundaries refer to those institutions and sectors, which interact with the proposed establishment in terms of utilities or concern either direct or indirect. These can be determined from political boundaries, Acts, Regulations and Institutional mandates and administrative organisations. This proposed establishment touches the interest of many institutions and administrative units in relation to several policies, laws and plans in Tanzania and several sector ministries. These institutions include;

- Ministry of Education Science and Technology
- Mvomero District Council
- Tanzania Commission of Universities (TCU)
- Fire and Rescue Force

- Occupational Safety and Health Authority (OSHA)
- RUWASA
- MORUWASA
- Wami /Ruvu Basin Water Board
- TANESCO
- Changarawe, Vikenge and Tangeni community

2.12.2 Temporal boundaries

Temporal boundaries refer to the period and reversibility of impacts. Most of impacts are short term but others may extend to long-term impacts. For example, the impacts such as noises and dusts may be short-lived, but the presence of the facility in the selected area may have implications that stretch far into the future until when decommissioning is undertaken. For instance, the issues of air pollution, waste management and dusts pollution may continue to be a problem unless measures are taken to ensure that acceptable limits are adhered to. In addition, consideration needs to be given to what happens when the project ends, where there is a need for decommissioning of the project and site restoration. Some of the impacts that will occur during construction and decommissioning such as increase in noise and dusts levels to be caused by demolition activities and disappear as soon as construction and decommissioning activities is completed. However, some impacts will remain irreversible even after the closure of the project. The ESIA process will address all impacts taking into account their temporal dimensions in various stages of the project.

2.12.3 Spatial boundaries

Spatial boundaries refer to the dispersion effect of the project impacts. The scale of dispersion can be locally, regionally, and nationally or internationally. The proposed establishment in the area will have a wide range of implications that could be felt locally, regionally, nationally or even internationally, thus causing impacts as far as to those areas. Therefore, in determining the spatial dimension of the project, it is important to consider impacts in a form similar to a contour layout. Two zones of impact namely core impact zone and influence impact zone are considered.

- Starting with the **core impact area** (where the project is located). In this case, the core impact area for the project will be Changarawe and Tangeni villages (where project will be located) and its nearby areas (Vikenge village) as where the impact will be felt.
- The second area is the **immediate impact area**. This is the area surrounding the core area and bears relatively some of the impacts. In case of the proposed project, the immediate impact area will be the neighboring area within Mvomero District Council in general which will benefit from revenues paid by the investor and from different social economic activities.
- The other area is area known as the area of influence. In terms of spatial dimension, this is the outer most area that consists of centers of decision making that can influence the development of proposed project.

2.13 Project Cost

MU has received financial support from the World Bank (WB) through the Government of the United Republic of Tanzania (GoT) under the project named Higher Education for Economic Transformation (HEET) which is about **10,000,000,000 TZS**. The total budget for the proposed establishment is summarized as follow;

Table 2.4: Estimated cost of the proposed establishment

S/N	Components	Cost (TZS)
1	ICT Complex and Innovation Incubation Centre	2,450,000,000
2	Cafeteria	1,360,000,000
3	Academic complex	3,180,000,000
4	Composting facility	420,000,000
5	External works (Local distributor roads, access roads, pedestrian walkways and parking spaces)	1,140,000,000
6	Reservoir tanks and Rehabilitation of existing water supply system	1,450,000,000
Total		**10,000,000,000**

Sampling date: April 2023 **Source: MU**

CHAPTER 3: POLICIES, LEGAL AND INSTITUTIONAL FRAMEWORK

3.1 Introduction

The basis of Environmental Management Are Policy, legal and administrative frameworks. In order to provide a broad guideline on areas of focus in undertaking environmental management activities in the sector a policy framework is vital. A legal and regulatory framework is essential for providing mandate, allocating specific responsibility and accountability to key actors and stakeholders, and also prescribes and enforces specific operating environmental procedures and standards.

Regulation on environmental management in the country is mainly vested on two public institutions, the National Environment Management Council (NEMC) and the Division of Environment (DoE) in the office of the Vice President. The NEMC undertakes enforcement, compliance, and review of environmental impact statements whereas the DoE provides the policy formulations and technical back-up and executes the overall mandate for environmental management in the country. The EIA certificate is issued by the minister responsible for environment. A few policies and laws that are relevant to the environmental and social management of the project are described in the subsequent sections.

3.2 Policies Relevant to the Project

The following are relevant Sectoral and cross–Sectoral policies that provide directives on how the project should operate in relation to the concerned environmental and socioeconomic settings. The proponent shall continue to consult these policies in the course of implementing the project activities.

Table 3.1: Policy Complience

S/N	POLICY	REQUIREMENT	COMPLIANCE STATUS
1	The National Environmental Policy, 2021	The policy provides the framework for the formulation of plans, programmes and guidelines for the achievement of sustainable development. Instruments for implementation include the use of Environmental Audit (EA), development of national standards and indicators, and the preparation of appropriate legislation. NEP encourages good land and water resources management to reduce undesirable environmental impacts such as soil salinity, water pollution and spread of water borne diseases.	MU has observed one of the requirements of the national environmental policy by putting measures to control and minimizing pollution thatr will happen during constructions and operations period.
2	The National Land Policy (1997)	The National land Policy is relevant to this project because the project will be required to ensure protection of existing cultural heritage and conservation of ecological and socially sensitive areas. In addition, to promote sound land information management and to protect land resources from degradation for sustainable development.	MU comply with this policy because the proposed building project is located within the area planned for institutions and as such it is compatible with the land use in the project area as required by the National Land Policy.
3	The Construction Industry Policy (2003)	Among the major objectives of the policy, which supports a sustainable block development sector, include the promotion and application of cost effective and innovative technologies and practices to support socio-economic development activities such as blocks, road-works, water supply, sanitation, shelter delivery and income generating activities and to ensure application of practices, technologies and products which are not harmful to either the environment or human health. This project is in-line with this policy as ultra-modern technology shall be used during construction and its operation.	This project is in-line with this policy as ultra-modern technology shall be used during construction and its operation. Implementation of the proposed establishment will as much as possible make use of cost effective and environmentally friendly technologies to minimize wastage of resources especially building materials, water and energy.
4	The National Employment Policy (2008)	The major aim of this policy is to promote employment mainly of Tanzania Nationals. Relevant sections of this policy are (i) 10, which lays down strategies for promoting employment and section 10.1 is particularly focusing on industry and trade sectors (ii) 10.6 which deals with employment of special groups i.e., women, youth, persons with disabilities and (iii) 10.8 that deals with tendencies of private industries to employ expatriate seven where there are equally competent nationals.	MU shall abide by this policy by employing Tanzanians who have the required qualifications as well as unskilled
5	The National Gender Policy (2002)	The key objective of this policy is to provide guidelines that will ensure that gender sensitive plans and strategies are developed in all sectors and institutions. While the policy aims at establishing strategies to eradicate poverty, it is relevant to the project as 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. It also requires that women and men are given equal employment opportunities in the project, whenever possible.	This project shall ensure that women will be adequately involved at all levels of project planning to implementation.
6	National Policy on HIV/AIDS (2001)	The policy recognizes that HIV infection shall not be grounds for discrimination in relation to education, employment, health and any other social services. Pre-employment HIV screening shall not be required. For persons already employed,	The proponent will adhere to the policy by availing HIV/AIDS information and voluntary screening services to its workers as

S/N	POLICY	REQUIREMENT	COMPLIANCE STATUS
		HIV/AIDS screening, whether direct or indirect, shall not be required. HIV infection alone does not limit fitness to work or provide grounds for termination. HIV/AIDS patients shall be entitled to the social welfare benefits like other patients among the employees. HIV/AIDS information and education targeting the behavior and attitudes of employees and employers alike shall be part of HIV/AIDS intervention in the workplace.	well as observing other provisions of the policy.
7	The Energy Policy (1992)	The policy advocates the adoption of renewable energy options. This project intends to integrate renewable energy (solar power) as part of the energy source.	MU will adhere to the policy by planning to intrgrate solar pannel as alternative energy source in they proposed establishment.
8	The National Water Policy (URT, 2002)	The policy aims to establish a comprehensive framework for sustainable water resource management in Tanzania. It acknowledges growing challenges like scarcity, misuse, and wastage of water, uncontrolled water abstraction, and inadequate monitoring due to resource and capacity constraintsIt emphasizes the importance of water for socio-economic activities and recognizes conflicts arising from competing water uses during droughts. Despite lacking prioritization criteria, the policy prioritizes domestic water supply and ecosystem maintenance. It highlights the need for better coordination between water and land development, especially amidst ongoing liberalization, to alleviate pressures on water resources and ensure smooth linkage.	The proposed establishment shall be designed in such a way that water use is kept to the minimum by, for example, installation plumbing fixtures such as faucets and flushing cisterns, which minimizes use of water. It will also ensure that pollution of water sources is avoided or minimized during the construction and operation phases.
9	The National Health Policy (URT 2003)	The main objectives of this policy is to ensure that health services are available and accessible to all people wherever they are in the country, whether in urban and rural areas. The policy encourages safe basic hygienic practices in workplaces, promote sound use of water, promotes construction of latrines and their use, encourage maintenance of clean environment; working environment which are conducive to satisfactory work performance.	The Proponent/Contractor shall observe this policy by providing good hygienic condition to the workers and shall continue to be provided with appropriate PPE's based on their working sections.
10	Education Training Policy (2014)	The policy stressed that for improvement of the quality of education in Tanzania there should be a shift from using many text books into using single text book for each subject. The policy also emphasizes all private schools need to have affordable school fees on the basis of "Unit per course" and analyse its operation as well. The school fees should relate with the service offered by the school.	MU through HEET will increase teaching and learning infrastructure which at the end will to increase enrolment of the students. And, also, the school fees will be affordable to all people.
11	National Mineral Policy (2009)	The National Mineral Policy also addresses that the mining activities should be undertaken in a sustainable manner. Reclamation of lands after mining activities is recommended. As far as this project is concerned, mining activities is directed to quarrying activities for obtaining stones and aggregates.	No mining activities will be undertaken by proponent within the project area as raw materials (Fine and coarse aggregates) for the proposed establishment shall be bought from authorized vendors.

3.3 Relevant Legal Framework

This section addresses the legal conditions that are relevant to the proposed project. This ESIA has been prepared in general compliance with the following legislations.

Table 3.2 Legislation Compliance

S/N	LEGISLATION	REQUIREMENT	COMPLIANCE STATUS
1	Environmental Management Act, Cap 191, 2004	The Environmental Management Act, Cap 191 establishes a legal framework for sustainable environmental management aligned with the National Environmental Policy. It ensures the continuity of the National Environmental Management Council (NEMC), empowering it for enforcement, compliance, and monitoring of environmental impact assessments. Proponents must also heed Environment Management Act Cap 72 concerning land use responsibilities and sustainability.	All section shall continue to be observed by Proponent in order to protect the environment against any sort of pollution (refer to the Environmental Management Plan of this report).
2	Occupational Health and Safety Act (2003)	This Act deals with the protection of human health from occupational hazards. It specifically requires the employer to ensure the safety of workers by providing safety gears at the work place.	The Proponent/Contractor will acquire a certificate of registration of a workplace from OSHA to abide to the law.
3	The Land Act, 1999, CAP 113 R.E. 2019	The Act seeks to control the land use and clarify issues pertaining to ownership of land and land-based resources, transactions on land and land administration. The law provides for technical procedures for preparing land use plans, detailed schemes and urban development conditions in conformity with land use plan and schemes.	The land is owned by the project proponent and title deed (certificate of occupancy) for the proposed establishment land is attached in appendix 1.
4	The Urban Planning Act (2007)	The law provides for the orderly and sustainable development of land in urban areas, to preserve and improve amenities; to provide for the grant of consent to develop land and powers of control over the use of land and to provide for other related matters.	The project will seek planning consent and building permits from relevant authorities.
5	Employment and Labour Relations Act, R.E 2019	The Act ensures fundamental labor rights and sets employment standards, offering extensive protection against discrimination. It mandates equal opportunity, prohibiting discrimination based on various factors including gender, pregnancy, marital status, disability, and age. Employers must take affirmative action to ensure a safe and healthy workplace for all genders.	The Proponent commits to enforcing labor laws, ensuring workplace equality, fostering economic justice, and upholding labor rights
6	The Engineers Registration Act and its Amendments 1997 and 2007	The Act provides restriction that no person other than a registered engineer shall engage in professional engineering work or services which includes professional service consultation, planning, designing or responsible supervision of construction or operation in connection with any public or privately owned public utilities, buildings, machines, equipment, processes, works or projects where public interest and welfare, or the safeguarding of life, public health or property is concerned or involved, and that requires application of engineering principles and data.	MU shall engage registered engineers to observe the provisions of the Act when executing its activities.

S/N	LEGISLATION	REQUIREMENT	COMPLIANCE STATUS
7	The Contractors Registration Act, 1997	This Act establishes the Contractors Registration Board (CRB). CRB has a mandate to register contractors, regulate the conduct of the contractors and for related matters. Among other things CRB is required to take legal action against unregistered contractors who undertake construction, installation, erection or alteration works; ensure that all construction sites are hoarded; and labour laws, occupational health and safety regulations in the construction industry are adhered to. On executing its construction activities.	The proponent shall therefore appoint a registered contractor and make sure that the provisions of the Act are adhered to.
8	The Architects and Quantity Surveyors, Act 2010	This Act was enacted by the parliament to provide for establishment of a board to regulate the conduct of Architects and Quantity surveyors and architectural and quantity surveying consulting firms in Tanzania. The board is vested with powers to inspect premises or construction sites to verify whether the rules and regulations of carrying out construction projects are adhered by consulting firms. This is aimed at ensuring that appropriate professionals who are registered by the board are involved in undertaking works as required by the law.	Therefore, the proponent shall abide by this Act by carrying out construction by adhered consulting firm.
9	Public Health Act, 2009	The Act provide for the promotion, preservation and maintenance of public health with a view to ensuring the provisions of comprehensive, functional and sustainable public health services to the general public and to provide for other.	The Proponent will observe this Act by promoting and preserve the public health.
10	Fire and Rescue Force Act, 2007	The act empowers the commissioner general of the force or his agent to enter premises to ascertain any contravention of provisions of the Act and obtain information required for firefighting purposes. A court may issue an order for a closure or prohibit the use of any premises for human habitation or storage in case there is failure to comply with fire prevention regulations. The Act also obliges the owners and managers of the structures to set aside places with free means of escape, and install fire alarm and detection systems, or such other escape and rescue modalities in the event of fire	The Proponent abide to this Act by making sure that the awarded Contractor and their employees undergo fire and rescue training and must have a certificate for compliance. Also, should make sure all the design structure and the site layout plan shall be submitted to Fire and Rescue Force for approve.
11	Water Resources Management Act, 2009	The Act provides for the protection of the water resources and the user so that there is a balance between different uses. The provisions of the Act will be adhered to during implementation by ensuring that surface and ground water sources are protected. Furthermore, water to be sourced from a borehole which will be drilled within the project area shall be used wisely at the project site and from the river shall have water use permit. And if the project area has wastewater treatment plant, the proponent shall have discharge permit from responsible authority	The proponent shall adhere with the act by ensuring the protection of surface and ground water resources, and their have water use permit from WRBWB for Tangeni river. However, currently MU has no discharge permit for its effluent from the existing WSP
12	Energy and Water Utilities Regulatory Authority Act, No 11, of 2011	Section 28 of the Water Supply and Sanitation Act confers EWURA among others powers to exercise licensing and regulatory functions in respect of water supply and sanitation services; establishment of guidelines on tariffs chargeable for provision of water and sanitation services; monitoring water quality and standards of performance for provision of water supply and sanitation services.	Proponent will comply with the act by increasing efficiency in the use energy and water utilisation.

S/N	LEGISLATION	REQUIREMENT	COMPLIANCE STATUS
13	The Workers Compensation Act, 2015	An Act to provide for the compensation to employees for disablement of death caused by or resulting from injuries or diseases sustained or contracted in the course of employment, to establish the Funds for administration and regulation of worker's compensation and to provide for related matter. It applies to both workers in the private and public sectors.	The Proponent shall comply with this act by ensuring that all workers from Contractor shall be compensated accordingly in this manner and registered to WCF.
14	Prevention and Control of HIV/AIDS Act, 2008	The Act primarily addresses prevention, treatment, and support for HIV/AIDS, promoting public awareness, reducing transmission, and providing community-based services. Section 4(1) emphasizes awareness and protection rights, while Section 19(2) focuses on community-based services, potentially impacting local HIV transmission dynamics.	The Proponent shall operate within the requirements of this legislation in addition to those of the HIV policy.
15	The Law of the Child Act, 2019	This act reforms and consolidates laws regarding children's rights, welfare, and protection. It addresses adoption, custody, employment regulations, and prohibits child labor exploitation by individuals or companies.	Contractor and MU vow to prevent child labor by enforcing rules during project, safeguarding those under fourteen.
16	The Roads and Fuel Toll Act, [Cap.220 R.E.2019]	The Roads Act covers financing, development, maintenance, and management. Key clauses include constructing access roads, notifying affected landholders, and regulating weight, speed, and dimensions. It also addresses offenses, penalties, and recovery procedures.	The project proponent shall observe relevant section of the Act by ensuring that his project don't affect the roads which is near the project site.
17	The Road Act, 2007	Part IX of the Act provides for offences and penalties against the contravention of the provisions of the Act. Furthermore, the Act stipulates that the Road authority shall be compensated in respect of the expenses incurred while repairing the road damaged by any person.	The project proponent shall observe relevant section of the Act by ensuring that his project will be located outside the road reserve.
18	Standard Act of 2009	The Standards Act establishes the National Environmental Standards Compendium (NESC) with compulsory standards (TBS), covering various industries' environmental impacts. Test methods for compliance are specified. The MU project will adhere to these requirements.	MU must adhere to Act, regulatory requirements, implement proposed mitigation measures for air pollution abatement, and follow environmental best practices.
19	Universities Act No. 7 of 2005	Universities Act No. 7 of 2005 provides for establishment of the Tanzania Commission for Universities (TCU) to provide the procedure for accreditation of institutions of higher learning and other related matters. The proposed project at MU will be regulated by the Tanzania Commission for Universities (TCU) for ensuring that quality education is offered, which meets the needs of all the stakeholders in line with this Act.	MU should ensure Tanzania commission for universities (TCU) provides procedures to higher education accreditation in the institution of the project, which will bring to the people related to on the project. The project complies with all the procedures of the universities act to be consulted for the project development.
20	The Education (Amendment) Act, 1995	This Act establish the Higher Education Accreditation Council, to provide the procedure for accreditation and other related matters. Among other functions, the council accredits higher education institutions; approve admissions into state institutions of higher education, to examine and approve proposals for courses of study	MU under HEET project will be monitored by Accreditation Council.

S/N	LEGISLATION	REQUIREMENT	COMPLIANCE STATUS
		and course regulations submitted to it by institutions of higher education; make regulations in respect of admission of persons seeking to enroll in state institutions of higher education and to provide a central admission service to higher education institutions; and make visitations and inspection of higher institutions.	

3.4 Relevant Regulations

Table 3.3: Regulation Compliance

S/N	REGULATIONS	REQUIREMENT	COMPLIANCE STATUS
1	The Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018	The Environmental Management (Environmental Impact Assessment and Audit) Amendment Regulations, 2018, are part of Tanzania Environmental Management Framework, building on the EIA and Audit regulations from 2005 under the Environmental Management Act No. 20 of 2004. These regulations establish procedures for conducting Environmental Impact Assessments (EIA) and Audits for development projects with significant environmental impacts. They outline steps like project registration with NEMC, screening, scoping, and producing an ESIA report, which must consider environmental, social, cultural, economic, and legal factors. The regulations are relevant to the MU project, requiring its registration and EIA study to comply with specified guidelines	Proponent has carried out this ESIA, hence, the requirements of these regulations are observed.
2	The Environmental Management (Fees and Charges) Regulations, 2021	The National Environment Management Council (NEMC), established under the Environmental Management Act Cap 191, oversees enforcement, compliance, and monitoring of environmental impact assessments, research, and awareness. Mandated by relevant regulations, it monitors industries for environmental effects, charging fees for compliance monitoring and audits, which are non-refundable as per the Environmental Management (Fees and Charges) Regulations, 2021.	MU complies with regulation by paying review fees as required by the NEMC Council.
3	Environmental Management (Air Quality Standards) Regulations, 2007	This standard aims to establish baseline air quality parameters, enforcing NEMC-prescribed standards for industries, promoting eco-friendly technologies to safeguard human health and the environment from pollution sources. Compliance with 2007 regulations is crucial.	MU will ensure that all emissions will be within recommended standard level.
4	Environmental Management (Soil Quality Standards) Regulations, 2007	This standard sets limits for soil contaminants in agriculture and habitat, ensuring adherence to minimum soil quality standards to sustain, restore, and enhance soil productivity. It also regulates expansion projects to prevent environmental contamination	MU complies by maintaining trucks and excavators to prevent oil spills and directing wastewater from washrooms to treatment facilities
5	Environmental Management (Water Quality Standards) Regulations, 2007	This standard aims to uphold water quality set by NEMC, considering the capacity of receiving waters to handle pollutants without harm, safeguarding human health and the environment through adherence to regulations.	MU complies with regulation, treating all liquid waste from project in WSP to protect environment
6	The Environmental Management (Standards	The regulation prohibits a person to make any loud, unreasonable, and unnecessary on unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety	MU ensures that these regulations are adhered by

S/N	REGULATIONS	REQUIREMENT	COMPLIANCE STATUS
	for Control of Noise and Vibration Pollution) Regulations, 2015	of others and of the environment describes the permissible noise levels from different facilities. The provisions of these regulations will guide in ensuring that noise and vibration levels do not exceed the maximum thresholds specified.	ensuring noise and vibrations produced during construction period are within acceptable limit.
7	The Urban Planning (Use Groups and Use Classes) Regulations, 2018	These regulations have been made under section 77(1)(i) of the Urban Planning Act (Act No. 8 of 2007). This regulation is made for the purposes of planning and the control of development, all uses of land and buildings are categorized in the use groups and use classes in the First Schedule. For proposed establishment at MU regarding MU title deeds it follows under Use Group K – Educational Buildings and Use Class: (d) Schools/Faculties, institutes, colleges, university colleges and universities.	MU abide to the requirement of the regulations because the lands shall be used solely for Educational purposes and for the other purposes ancillary thereto.
8	The Urban Planning (Application for Planning Consent) Regulations, 2018	These regulations, pursuant to section 77(1)(o) of the Urban Planning Act (Cap. 355), mandate that all development within the Planning Area must obtain planning consent from the Planning Authority. Additionally, they require specific documentation including block plans, elevation plans, floor plans, and site plans for proposed developments.	MU will abide to the requirement of the regulations.
9	The Urban Planning (Planning Space Standards) Regulations, 2018	The Urban Planning Space Standards offer guidelines for efficient space use, aiming for sustainable development. Applied to the HEET project at MU, these standards informed building design and site selection. They dictate building heights, setbacks, plot coverage, and provision for transport systems, including roads, parking, and pedestrian walkways.	MU HEET project integrates urban planning space standards into building design, ensuring efficient project area utilization throughout implementation.
10	The Urban Planning (Zoning of Land Uses) Regulations, 2018	The regulations, based on section 77(1)(d) of the Urban Planning Act (Cap. 355), detail permissible land uses in different zones. Residential, commercial, industrial, institutional, public utilities, beach, open spaces, recreational, transportation, communication, agricultural, water bodies, conservation, and economic development uses are specified. Institutional zones allow central and local government offices, educational institutions, cultural and religious centers, medical facilities, recreational areas, utilities, and essential staff quarters, among other uses, subject to specific criteria.	MU will abide to the requirement of the regulations during design and construction period.
11	The Industries and Consumer Chemicals [Management and Control] Regulations, 2020	The Industrial and Consumer Chemicals Act in Mainland Tanzania mandates registration for those dealing with industrial chemicals. Managed by the Industrial and Consumer Chemicals Management and Control Board, it lists chemicals requiring registration. Compliance with the law is crucial during importation, storage, use, and disposal of chemicals to meet legal requirements.	MU will use registered chemicals in Tanzanian labs, avoiding imports by sourcing from local importers for their projects.
12	The Environmental Management [Control of Ozone Depleting Substances] Regulations, 2007	Regulations identify products with ozone-depleting potentials, including automobile and truck conditioning units, refrigeration, and air conditioning equipment containing controlled substances. This encompasses refrigerators, freezers, dehumidifiers, water coolers, ice machines, and air conditioning units. Dust emissions may occur during material handling, especially during construction at MU.	MU should adhere to this regulation so as not to participate in ozone depleting and pay pollution cost when needed.
13	The Environmental Management (Solid	The regulation has been made under section 114, 115, 116,117, 118, 119, 120,121, 122 and 230 of Environmental Management Act, 2004. These regulations apply to all matter	MU will ensures proper handling of construction and operational

S/N	REGULATIONS	REQUIREMENT	COMPLIANCE STATUS
	Waste Management) Regulation, 2009 as amended in 2016	pertaining to solid waste management. They aimed among other things at setting standard for permit to operate solid waste disposal sites, permit to transport solid waste, permit to dispose solid waste and license to own or operate solid waste disposal site.	waste to prevent pollution and comply with regulations
14	Environmental Management Act (Hazardous Waste Control) Regulations, 2021	This regulations under the Environmental Management Act, 2004, mandate Tanzanian residents to protect the environment from hazardous waste. They must report any hazardous waste activities to authorities. These rules cover hazardous waste handling, including generation, storage, and disposal, within mainland Tanzania. Principles of environmental sustainability like precautionary, polluter pays, and producer extended responsibility guide waste management.	MU will abide to the requirement of the regulations.
15	The Environmental Management (Control and Management of Electrical and Electronic Equipment Waste) Regulations, 2021	The Regulations apply to all categories of electrical and electronic equipment wastes with respect to generation, collection, storage, transportation, importation, exportation, distribution, selling, purchasing, recycling, refurbishing, assembling, dismantling and disposal of electrical and electronic equipment waste or components, and their movement into or outside Mainland Tanzania. The amount of waste electrical and electronic equipment (widely known as WEEE or e-waste) generated every year in Tanzania is increasing rapidly. Waste from electrical and electronic equipment includes a large range of devices such as computers, printers, fridges and mobile phones at the end of their life. This type of waste contains a complex mixture of materials, some of which are hazardous. These can cause major environmental and health problems if the discarded devices are not managed properly. These regulations require the separate collection and proper treatment of WEEE and sets targets for their collection as well as for their recovery and recycling.	Thus, MU shall ensure compliance with all these requirements during the implementation of the project.

3.5 Relevant National Plans/Strategies

In order to guide national development more effectively and systematically, Tanzania has prepared a number of strategies aiming at operationalizing the various policies in key sectors. Some of the strategies that have a bearing on the proposed project are:

3.5.1 The Tanzania Development Vision 2025

The Composite Development Goal for the Tanzania Development Vision 2025 foresees the alleviation of poverty through improved socio-economic opportunities, good governance, transparency, and improved public sector performance. These objectives not only deal with economic issues, but also include social challenges such as education, health, the environment and increasing involvement of the people in working for their own development. The thrust of these objectives is to attain a sustainable development of the people. The Vision 2025 seeks to mobilize the people, the private sector, and resources of the nation towards achievement of shared goals and achieving a sustainable middle market economy by 2025. The vision outlines Tanzania plans and strategic goals covering all sectors of the economy and outlines institutional changes that must take place to enable Tanzania to make the progress suggested in the vision. The proposed project will stimulate local economic growth and will contribute towards realisation of the Vision ‘s objectives.

Compliance: *MU project will contribute to the attainment of the 2025 Vision through provision of adequate skilled labor force for implementing various development plans.*

3.5.2 The Five Years Development Plan (FYDP) 2021/2022-2025/2026

FYDP III focuses on stimulating an inclusive and competitive economy, strengthening industrial production capabilities and service delivery, promoting investment and trade, bringing development to the citizens and building huma resource capacity. By investing on this project, Mzumbe University is promoting the development in Tanzania which is the main focus of the FYDP III.

To facilitate its implementation, this plan has been developed in line with the implementation Strategy which is divided into three implementation plans. First, is the Action Plan which outlines all activities and objectives intended for whole period of implementation. The second is the Financing Strategy (FS) that shows how to avail funding for development projects as well as other strategic steps outlined in the Plan. The latter has prepared a Monitoring and Evaluation Strategy (MES) for monitoring the implementation of projects to know whether the intended results are being met and prompt corrective measures whenever needed to ensure delivery of the intended results. Through the slogan of the Sixth Phase Government of Kazi Iendelee, each of us has a responsibility to fulfill assigned responsibilities effectively in order to achieve effective implementation of this Plan.

3.5.3 Project Operational Manual

The Project Operational Manual (POM) sets forth all the operational and procedural steps which will guide the implementation of the Higher Education for Economic Transformation Project

(HEET) at Mzumbe University. The Operational Manual offers a brief description of the components, details the results expected to be achieved through HEET and outlines the operational and financial reporting arrangements, procurement and disbursement processes, standard formats for biannual and annual reporting and amendment procedures. The manual is supported and complimented by a series of technical documents which will provide further guidance on key project components, and shall be used in conjunction with the recent versions of the Project Appraisal Document (PAD), Legal Agreement, and Environmental and Social Management Framework (ESMF).

The primary users of the POM will be the technical, financial, operational and administrative staff at MU, consultants, contractors and any other agency tasked with implementing and monitoring any part of HEET-MU.

3.5.4 Project Appraisal Document (PAD)

This document provides the project formulation underpinning. It describes the strategic context, project description including its project development objectives, components, beneficiaries and rationale for the World Bank involvement and role of partners. Further, the document outlines theimplementation arrangements. Grievance redress services as well as the key risks and results framework and monitoring have also been presented in PAD. The projects under MU will be implemented in line with the requirements by PAD.

3.6 Relevant International Agreements, Conventions and Treaties

International agreements, convention and treaties which are relevant to this project include:

- United Nations Framework Convention on Climate Change (1992)
- Paris Agreement (2015)
- The Convention on Biological Diversity (1992)
- Stockholm Convention (2001)
- United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification (UNCCD-1994)
- International Labour Convention

3.6.1 United Nations Framework Convention on Climate Change (1992)

The objective of the United Nations 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.

Since Tanzania is a Party to the Convention, she will have to account for all sources of GHG in her future National Communications. Undertaking of this ESIA study will enable the country to identify some of the GHG that will be emitted by the project activities.

Compliance: *MU project will abide with the requirements on control and prevention of greenhouse gases by emphasizing use of soft copies as opposed to hard copies in teaching and learning.*

3.6.2 Paris Agreement (2015)

The Paris Agreement aims to hold global temperatures 'well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C' (Art. 2.1.(a)) Since Tanzani is among the parties to the agreement she will make profound changes to its economy to achieve this goal.

Compliance: *MU project will abide with the requirements to reduce greenhouse gas emissions, at least to a point where there is a balance between emissions and sequestration by discoraging the use of soild biomass fuels and encourage utilisation of clean, sustainable energy fuels including Liquefied Petroleum Gas (LPG), electricity and sustainable biomass.*

3.6.3 The Convention on Biological Diversity (1992)

The Convention on Biological Diversity (1992) has three objectives which are; the Conservation of biological diversity; sustainable use of biodiversity components, and the fair and equitable sharing of the benefits arising from the utilisation of genetic resources.

Tanzania ratified the conversion on biological diversity in 1996 and launched the National Biodiversity Strategy and Action Plan with a sectoral approach.The Government has committed to ambitious national targets for biodiversity conservation.

Compliance: *MU project will abide with the requirements to safeguard biological diversity by enhancing protection of different plant and animal species around the university; and take measures for vulnerable ecosystems against climate change.*

3.6.4 United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification (UNCCD-1994)

The objective of the Convention, provided in article 2, is "to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements. Tanzania ratified the UNCCD in 1997 with the obliged to implement the provisions of the Conventions within her respective capacity in support of sustainable development.

Compliance: *MU project will abide with the requirements to combat desertification and mitigate the effects of drought by undertaking different measures to control floods, minimize deforestsion, manage water resources and induce water harvesting technologies.*

3.6.5 International Labour Conventions

International Labor Organisation (ILO) Conventions ratified by Tanzania include: C138 Minimum Age Convention of 1973, which prohibits child labor, and C182 Worst Forms of Child Labor Convention of 1999. As the conventions have been adopted by the Tanzania Government, MU project will abide by them and ensure that no child labor is practiced throughout the project. Other relevant agreements include ILO Convention C148 Working Environment (Air Pollution, Noise and Vibration) Convention of 1977, which protects workers against occupational hazards in the

working environment due to air pollution, noise and vibration. The proposed project will ensure workers work in safe environment.

3.7 Institutional Framework for the Management of Environment

Tanzania is among countries in East Africa with an Act for environmental management legislation. The legislation, Environmental Management Act (EMA) (2004), provides a legal and institution framework that guides the implementation of the environmental management activities. The framework provides a pre-requisite for effective implementation of Environment Policy at all levels (National, Region, Council, and Village/Mtaa/Hamlet). According to the Environmental Management Act (EMA) (2004), there is the Environmental Management Committee established at the Hamlet/Village/Mtaa, Ward, and Council and at National level with the responsibility for the proper management of the environment in respect of the area in which they are established. The functions and responsibility of these committees are well explained in the Act. The proposed project will include all governance levels in the management of environment during HEET execution as shown in Table 3.1 below

Table 3.4: Key Institutions to the ESIA process

Level	Institution	Roles and responsibilities
National Level	Vice Presidents Office (Division of Environment)	o Coordinate the implementation of the National Environmental Policy. o Coordinate various environment management activities in Tanzania. o Advise the Government on legislative and other measures for the management of the environment. o Advise the Government on international environmental agreements. o Monitor and assess activities, being carried out by relevant agencies in order to ensure that the environment is not degraded. o Prepare and issue a report on the state of the environment in Tanzania.
	Vice Presidents Office (NEMC)	o Coordinate Environmental Management Policy, Act and EIA guidelines o Approval of ToR, Review of ESIA o Issuing an Environmental Certificate o Review and recommend for approval of environment impact statements o Enforce and ensure compliance of the national environmental quality standards o Initiate and evolve procedures and safeguards for the prevention of accidents which may cause environmental degradation and evolve remedial measures where accidents occur; o Undertake in co-operation with relevant key stakeholders' environmental education and public awareness;
	Ministry of lands, housing and human settlements development	o Authority over the national land including the project area. o Enforce law and regulations in the area of influence of the project.

Level	Institution	Roles and responsibilities
	Ministry of Education, Science and Technology (MoEST)	o To develop and implement Policies on Education, Research, Library Services, Science, Technology, Innovation, Skills, Training Development and their implementation; o To improve Basic Education Development through Teachers Training Accreditation and Professional Development; o Teachers Professional Standards Development; o Schools Accreditation and Quality Assurance; o Development of Local Experts in Science, Technology and Innovation; o Coordinates roles of Departments, Parastatal Organisations, Agencies, Programmes and Projects under the Ministry.
	Tanzania Commission for Universities (TCU)	o Mandate to recognize, approve, register and accredit Universities. o Conduct regular and impromptu periodic evaluation of universities, their systems and programmes. o Advise the government and the general public on matters related to higher education in Tanzania as well as international issues pertaining to higher education, including advice on program and policy formulation and other best practices. o Providing support to universities in terms of coordinating the admission of students, offering training and other sensitisation interventions in key areas like quality assurance, university leadership and management, fund raising and resources mobilisation, entrepreneurial skills and gender mainstreaming.
	Occupation Safety and Health Authority OSHA	o Approval of building plans for the proposed project. o Monitoring Health and Safety of workers in working premises. o Issuing certificates of compliance and oversee occupational safety and health issues. o Designated Authority for occupational safety issues
	Fire and Rescue Force	o To provide professional services in the area of disaster prevention and taming. o Approval of building design for the proposed project. o To enhance community safety, quality of life and confidence by minimizing the impact of hazards and emergency incidents on people, environment and economy of Tanzania. o To work with other government agencies to minimize impacts of bushfires, storms, floods, landslides, building collapses, motor vehicle accidents and other emergencies. o To run prevention and preparedness programs to prevent emergencies and reduce their impact on the community.
Project Proponent	Mzumbe University (MU)	o Project investment and project cycle implementation, monitoring and auditing; Conducting ESIA study and follow-up on ESIA certificate. o Land acquisition and payment of compensations. o Paying of applicable taxes and charges. o Project operation and decommissioning
Regional Level	Morogoro Region	o Oversee and advice on implementation of national policies at regional level.

Level	Institution	Roles and responsibilities
		o Oversee enforcement of laws and regulations. o Advice on implementation of development projects and activities at regional level.
Local Governments Authorities and Communities	Mvomero District Council	o Oversee and advice on implementation of national policies at District level. o Oversee enforcement of laws and regulations. o Advice on implementation of development projects and activities at District level
	Ward Office and Village Office at MU	o Project monitoring (as watchdogs for the environment, ensure the well-being of residents) and participate in project activities. o To extend administrative assistance and advice on the implementation of the project. o Managing the community's relation
	Local communities, NGOs, CSOs and FBOs	o Project monitoring (as watchdogs) o Provides assistance and advice on the implementation of the project o Part of the project beneficiaries through employment opportunities, income generation and CSR projects.

3.7.1 Principal Participants in the Implementation of the Proposed Project

In order to guarantee the robust advancement and successful execution of the envisioned project, it is imperative to delineate and specify the roles and authority of key project implementors. The involvement of the following entities will play a crucial role in this process;

- Funding Institutions
- Mzumbe University (MU)
- National Environmental Management Council (NEMC)
- Supervison Engineer/Consultant
- Design Consultant
- Contractor

3.7.1.1 Funding Institutions (GoT and World Bank)

The primary responsibility of HEET project funders is to ensure the meticulous execution of the project in adherence to the highest environmental and social standards, in strict accordance with the Environmental and Social Framework (ESF), Environmental and Social Standards (ESSs), and Environmental Impact Statement (EIS).

Table 3.5: Principal Participants in the Implementation of the Proposed Project

S/N	Institutions/ Position	Roles and responsibilities in HEET Project
1	**World Bank**	○ Review sub-project screening including risk level categorization; ○ Review the ESIAs, ESMPs and site specific ESMPs; ○ Review quarterly reports by the implementing agencies; ○ Monitor compliance with the ESMF; and ○ Undertake implementation support missions.
2	**UPIU-MU**	○ Coordinate specialist/consultants for any support missions or attend different meetings and provide any guidance in the bid to ascertain that the different challenges identified for each sub-project/activity are duly covered from risk. ○ Support the procurement officer at respective project implementing institutions in making sure that the bidding documents clearly cover the health, safety and environmental component with appropriate provisions of the same for the contractors to bid. ○ Coordinate preparation of ESIA and environmental and social management plans (ESMPs) done by consultant and site-specific ESMPs (SSESMP). ○ Ensure implementation of the ESMP and mitigation measures aligns with pertinent national policies, legislations, and the World Bank Environmental and Social Standard (ESS1). MU oversees the Project Implementation Unit (PIU), tasked with supervising and monitoring the implementation of project construction activities. ○ Ensure that contractors have an Environmental Health and Safety Officer (EHS), who are familiar with the compliance requirements, including WB EHS guidelines. ○ Review progress reports by the supervision engineer/consultant during civil works and conduct inspection of the sites. ○ During project operation, overall management falls under the UPIU, collaborating with other departments and units as per the activity's nature. Generally, the UPIU operates under the day-to-day management of MU. ○ The UPIU is overseen by management meetings chaired by the Deputy Vice Chancellor, providing support, guidance, and oversight. Additionally, the UPIU designates Environmental and Social Safeguard Specialists for the supervision and monitoring of project implementation.
3	**NEMC**	○ Receive ESIA/ESMP reports, review and provide recommendations for improvement and further guidance ○ Provide environmental permit where necessary upon receiving of ESIA / ESMP reports prepared by consultants on behalf of clients ○ Invited to deliver presentations in some of the trainings conducted by the project on environmental and social issues in the country. They can be invited as participants sometimes to allow them share experience. ○ Conduct monitoring of environmental and social issues during project implementation and provide guidance on the way forward.
4	**Supervision Engineer/ Consultant**	**a. Environmental specialist(s)** ○ They shall guarantee that contractors employ an Environmental Health and Safety Officer (EHS) who is well-versed in compliance requirements, including World Bank Environmental Health and Safety (WB EHS) guidelines ○ Assist the PIU to ensure that the necessary environmental, health and safety authorizations and permits have been obtained; ○ Maintain open and direct lines of communication between the PIU and contractor(s) with regard to environmental matters;

		○ Review and approve the contractor's site-specific construction ESMPs (CESMP), Waste Management Plans together with the PIU; ○ Conduct regular site inspections of all work areas to ensure compliance with CESMPs and E&S specifications for contractors Assist the contractor in finding environmentally responsible solutions to problems; ○ Instruct the contractor(s) to stop activities which generate adverse impacts, and/or when the contractor(s) fails to implement the ESMP requirements / remedial actions; ○ Monitor the contractor's environmental awareness training program for all personnel working onsite; ○ Prepare written reports for the PIU such as weekly report of non-compliance issues; summary monthly report covering key issues and findings from supervision activities; and consolidated summary report from contractor's monthly report. **b. Social specialist(s)** ○ Facilitating dialogue between project stakeholders, including local communities, to address concerns and ensure their perspectives are considered. ○ Ensuring project activities adhere to Tanzanian regulations, policies, and World Bank standards related to social safeguards and community well-being. ○ Providing training and support to project staff and community members on social issues, grievance mechanisms, and community development initiatives. ○ Regularly monitoring project activities to assess their social impacts, effectiveness of mitigation measures, and compliance with agreed-upon standards and regulations. ○ Compiling and submitting regular reports on social performance, community engagement activities, and compliance with regulatory requirements to relevant stakeholders, including the UPIU and World Bank. ○ Identifying and mitigating social risks associated with the project, such as conflicts with local communities, land acquisition issues, and cultural heritage preservation. ○ Working closely with other project stakeholders, including government agencies, NGOs, and local authorities, to coordinate social interventions and maximize positive project impacts while minimizing negative ones. **c. Health and Safety Officer (EHS)** ○ Ensure that all construction activities adhere to World Bank Standards, Tanzanian regulations, and relevant policies and legislations concerning health and safety. ○ Regularly inspect construction sites to monitor compliance with safety standards and identify any deficiencies that need addressing. ○ Provide training to the contractor on the EHS requirements to be followed; ○ Review and approve the contractor's site-specific construction ESMPs (CESMP), Health and Safety Mangement Plan, Waste Management Plan, Labour Management Plans and Traffic Management Plans together with the PIU; ○ Monitor protocols for handling accidents or emergencies on construction sites from contractor, including immediate response procedures and post-incident investigations. ○ Monitor the contractor's environmental awareness training program for all personnel working onsite; ○ In case of any accidents or incidents, immediately notify the PIU and support the process of documenting and reporting the case to the WB;

		○ Conduct thorough risk assessments of construction sites to identify potential hazards and develop mitigation strategies to prevent accidents and injuries. ○ Prepare written reports for the PIU such as weekly report of non-compliance issues; summary monthly report covering key issues and findings from supervision activities; and consolidated summary report from contractor's monthly report. ○ Maintain comprehensive records of safety inspections, incident reports, and compliance documentation, and submit required reports to UPIU and project stakeholders. ○ Collaborate with UPIU, contractors, and workers to promote a culture of safety and ensure that safety considerations are integrated into all aspects of project planning and execution.
5	**Design Consultant**	○ Understand the sub-project setting and site-specific requirements with discussions with the PIU; ○ Incorporate the issues identified in the ESIAs, ESMPS into the project design. ○ Provide cost estimates for implementing the design requirements.
6	**Contractor**	**a. Environmental Specialist (s)** ○ Compliance with relevant environmental and social legislative requirements (project-specific, district- and national level), including allocating adequate budget for implementation of these requirements; ○ Prepare CESMPs based on the ESMP in the bidding documents and contracts; ○ Work within the scope of contractual requirements and other tender conditions; ○ In case of non-compliances/discrepancies, carry out investigation and submit proposals on mitigation measures, and implement remedial measures to reduce environmental impact; ○ Propose and carry out corrective actions in order to minimize the environmental impacts; ○ Provide training to project personnel on environmental best practices and build capacity for effective environmental management. ○ Develop contingency plans and response protocols to address environmental emergencies or incidents that may arise during construction ○ Implement monitoring programs to track environmental parameters during construction activities; ○ Maintain accurate documentation of environmental compliance activities and ensure that all necessary permits and approvals are obtained. ○ Identify opportunities for improving environmental performance and implement measures to minimize negative impacts and enhance sustainability. ○ Send weekly reports of non-compliance to the Supervision Engineer/consultant; and ○ Send monthly progress reports to the Supervision Engineer/consultant. **b. Social specialist(s)** ○ Ensure adherence to World Bank Standards and Tanzanian regulations, policies, and legislation concerning social aspects of construction projects. ○ Developing mitigation strategies to address social risks and impacts. ○ Facilitate meaningful engagement with local communities, government agencies, NGOs, and other stakeholders affected by the project throughout the project lifecycle. ○ Monitoring project activities to ensure compliance with social safeguards. ○ Providing capacity building and training to project stakeholders on social issues. ○ Collaborating with relevant government agencies to ensure alignment with national policies and legislations.

		○ Reporting on social performance and addressing grievances from affected communities. ○ Ensuring transparency and accountability in project implementation, promoting sustainable development goals. ○ Continuously review and improve social management strategies and practices to enhance project outcomes and minimize negative impacts on communities. **c. Health and Safety Officer (EHS)** ○ Prepare and implement the contractor's site-specific construction ESMPs (CESMP), Health and Safety Mangement Plan, Labour Management Plans and Traffic Management Plans. ○ Organize and facilitate regular safety training sessions about EHS (including relevant WBG EHS Guidelines) for all personnel involved in the project to enhance awareness and ensure adherence to safety protocols. ○ Perform frequent site inspections with the PIU and Environmental Supervision Engineer/consultant to monitor compliance with safety regulations, identify any unsafe practices or conditions, and take corrective actions as necessary ○ Develop and implement emergency response plans to effectively manage accidents, injuries, or other emergencies that may arise during construction activities. ○ Carry out any corrective actions instructed by the Supervision Engineer/consultant; ○ Provide training to the labourees on the EHS requirements to be followed; ○ Monitoring and reporting covers details of fatalities, injuries, crash types, and locations. ○ Maintain comprehensive records of safety inspections, incidents, and corrective actions taken, and ensure timely reporting to relevant authorities as per regulatory requirements. ○ Foster a culture of safety among all project stakeholders, encouraging active participation and accountability for maintaining a safe work environment. ○ Liaise with relevant government agencies, regulatory bodies, and other stakeholders to ensure alignment with health and safety standards and facilitate inspections or audits as needed. ○ Continuously monitor and evaluate safety performance, identify areas for improvement, and implement measures to enhance safety standards throughout the project lifecycle.

3.8 Environmental and Social Management Framework (ESMF)

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. In that context, the World Bank has set out the E&S standards that must complied with in the implementation of any project. These standards among others aim to support borrowers in achieving good international practice relating to environmental and social sustainability, assist borrowers in fulfilling their national and international environmental and social obligations, enhance non-discrimination, transparency, participation, accountability and governance; and (d) enhance the sustainable development outcomes of projects through ongoing stakeholder engagement.

This section (Table 3.5) shows how the 10 E&S standards of the World Bank are taken on board on ensuring that all HEET projects to be implemented at MU are environmentally and socially sensitive.

3.8.1 Objective of the Environmental and Social Framework

The proposed project will be developed and implemented according to the requirements of the World Bank Environmental and Social Framework (ESF). The ESF sets out the World Bank's commitment to sustainable development. The ESF protects people and the environment from potential adverse impacts that could arise from Bank-financed projects and promotes sustainable development. The ESF enables the World Bank and Borrowers to better manage environmental and social risks of projects and to improve development outcomes. The ESF also places more emphasis on building Borrower governments' own capacity to deal with environmental and social issues. The ESF offers broad and systematic coverage of environmental and social risks. It makes important advances in areas such as climate change; labour standards; transparency; nondiscrimination; social inclusion; public participation; and accountability - including expanded roles of grievance redress mechanisms. The ESF codifies best practice in development policies. It brings the World Bank's environmental and social protections into closer harmony with those of other development institutions; and encourages Client countries to use, and improve, their own national environment and social policies, when these policies are materially consistent with the ESF and supported by adequate implementation capacity. The ESF provides an incentive for countries to develop and build their own environmental and social policies and capacity.

Table 3.6: World Bank Environmental and Social Standards

Environmental and Social Standards (ESS)	Applicability	Requirements
ESS1: Assessment and Management of Environmental and Social Risks and Impacts	YES	The standard focuses in helping project beneficiaries to manage and reduce both environmental and social risks and enhance project positive impacts. The project at MU will use this requirement in order to strengthen the environmental and social framework for the assessment, development, and implementation of World Bank-financed projects where appropriate.
ESS2: Labor and Working Conditions	YES	The standard focuses on the adoption of standard labor practices that take into account the acceptable working conditions for the people to be employed in the execution of the project activities. It requires the Borrower to prepare and adopt labor management procedures. Among others the standard call for provisions on the treatment of direct, contracted, community, primary supply workers, and government civil servants. It further calls for fair terms and conditions of work, non-discrimination and equal opportunity and workers organisations. Provisions on child labor and forced labor. Requirements on occupational health and safety, in keeping with the World Bank Group's Environmental, Health, and Safety Guidelines (EHSG).
ESS3: Resource Efficiency and Pollution Prevention and Management	YES	The standard aims at enhancing effective use of resources and control of pollution. It further requires an estimate of gross greenhouse gas emissions resulting from project (unless minor), where technically and financially feasible. Requirements on management of wastes, chemical and hazardous materials, and contains provisions to address historical pollution. ESS3 refers to national law and Good International Industry Practice, in the first instance the World Bank Groups' EHSGs.
ESS4: Community Health and Safety	YES	The standard aims at protecting local communities against any health risks and ensure their safety against project activities. It requires infrastructure to take into account taking safety and climate change, and applying the concept of universal access which are technically and financially feasible. It requires further on traffic and road safety, including road safety assessments and monitoring. It calls for addressing risks arising from impacts on provisioning and regulating ecosystem service. Measures to avoid or minimize the risk of water-related, communicable, and non- communicable diseases. Requirements to assess risks associated with security personnel, and review and report unlawful and abusive acts to relevant authorities.

Environmental and Social Standards (ESS)	Applicability	Requirements
ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	NO	This standard is not applicable in this proposed project because the proposed land is legally owned by MU (Appendix 1)
ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	NO	The area of the proposed establishment of MU facilities has no any sensitive habitat/ species
ESS7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	NO	This standard is not applicable in this project because there nothing related to ESS7.
ESS8: Cultural Heritage	YES	This standard is applicable for the proposed project due to chance finds of physical cultural resources during excavation activities for new construction..
ESS9: Financial Intermediaries (FIs)	NO	This standard is not applicable in this project because there is nothing related to ESS9.
ESS10: Stakeholder Engagement and Information Disclosure	YES	The standard aims at making stakeholders part of the project through continuous sharing of information and updates. The standard call for stakeholder engagement throughout the project life cycle, and preparation and implementation of a Stakeholder Engagement Plan (SEP). It requires early identification of stakeholders, both project-affected parties and other interested parties, and clarification on how effective engagement takes place. Stakeholder engagement to be conducted in a manner proportionate to the nature, scale, risks and impacts of the project, and appropriate to stakeholders' interests.

3.8.2 Assessment and Management of Environmental and Social Risks and Impacts (ESS1)

The proposed establishment of MU facilities on the Main campus entails clearing some secondary vegetation, including grasses and indigenous trees, which are currently under environmental conservation by MU. This project falls under the Environmental and Social Standard due to potential adverse environmental risks such as impacts on air, water, land, human health, and safety. MU is obligated to analyze project activities and associated risks during construction. An Environmental and Social Impact Assessment (ESIA) and/or Environmental and Social Management Plans (ESMPs) have been prepared to identify potential adverse impacts and mitigation measures. Additionally, the increase in student enrollment may strain social services like playing grounds, religious spaces, and accommodation both within and outside the campus, prompting a reevaluation of current provisions to alleviate pressure on local communities.

3.8.3 Labor and Working Conditions (ESS2)

The standard recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. ESS2 is applicable to the project given that the project will employ/engage both skilled and non-skilled workers, through contractors/subcontractors, and primary suppliers, to undertake various activities. In order to comply with the provisions of ESS2, MU will take worker safety seriously by laying out internal controls and procedures that will protect workers employed or engaged in relation to the project from occupational hazards during all relevant project phases.

The standards outlines comprehensive measures to ensure compliance with environmental, health, and safety standards during project execution, aiming to minimize adverse effects on workers, local communities, and the environment. It emphasizes the incorporation of robust procedures for worker safety and accident prevention in contracts for civil works. Additionally, it underscores the commitment to promoting gender equality, non-discrimination, and fair treatment in employment practices, in accordance with national labor laws. Contractors and subcontractors are mandated to adhere to policies that prohibit child and forced labor, combat gender-based violence, and ensure equal employment opportunities without discrimination based on various factors such as nationality, religion, gender, and others.MU will ensure that workplace sexual harassment of any nature by workers directly hired or project workers engaged through contracts/subcontracts companies shall be prohibited, and those determined to be guilty will be subject to disciplinary action, including summary dismissal.

3.8.4 Resource Efficiency and Pollution Prevention and Management (ESS3)

This ESS3 sets out the requirements to address resource efficiency and pollution prevention and management throughout the project lifecycle. In order to ensure the efficient use of resources, MU projects will source construction materials from government authorized sources and water from their own independent source (Tangeni river) throughout the project implementation. MU has a total area of 985.35 Acres but currently the built-up area covers an area of 234.55 Acres and the rest is undeveloped land which has been planned for further expansion of the University. This

implies ta the big portion of the MU is covered by green spaces and number of tons of CO_2 generated per year from main sources like cafeterias, vehicles will be sequestered by the available green spaces.

Moreover, the project will utilize the pollution prevention and emergency response plan drafted as part of the ESIA to mitigate any potential source of pollution from the planned activities. The risks identified for strengthening the system for complying with ESS1 are applicable to ESS3.

3.8.5 Community Health and Safety (ESS4)

The ESS requires beneficiary to avoid or minimize safety and health risks and impacts of the project, with particular attention to people who, because of their particular circumstances, may be vulnerable. Implementation of project components has the health and safety risks and impacts on project-affected communities. These risks and impacts could include increased rates of crime, and social conflict and violence, increases in traffic accidents, increased pressure on local accommodation and rents, increased transmission of HIV/STDS, as well as increases in gender-based violence.

The project will ensure compliance with national law requirements regarding the COVID-19 situation. MU shall work closely with street leaders to communicate to local communities related health and safety risks and preventive measures for accidents associated transportation of materials and other human health issues including covering mitigation measures to GBV risks and prevention of HIV and AIDS during construction.

All works will be done in compliance with relevant environmental and health and safety standards to minimize impact on workers and the local area. During the project's operational phase, waste will be disposed of to dumpsite.

In order to ensure safety during project implementation, MU will ensure that contractors and sub-contractors enclose all project sites in fencing for safety and security reasons. Where required, adequate safety clearance zones can be established on sites where neighboring activities may affect project operation. Appropriate safety signage shall be put in place to warn potential dangers associated with trespassing or accessing the enclosure with no supervision. The ESIA process shall contain robust procedures for accident prevention as well for health and safety of project affected communities.

3.8.6 Cultural Heritage (ESS8)

This recognizes that cultural heritage provides continuity in tangible and intangible forms between the past, present and future. People identify with cultural heritage as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions. In that regard, it echoes out the need to protect cultural heritage from the adverse impacts of project activities and support its preservation.

Hence, the project will ensure measures defined in the ESMF and contracts are follow by contractors during excavations and road clearing (if any) to avoid impacts to cultural heritage and

also ensure that chance find procedures will be enforced. HEET project will consult Division of Antiquities in the Ministry of Natural Resources and Tourism on application of the ESS8.
However, no specific cultural sites were identified within the MU-Main capus project area BUT the ESS8 is applicable due to chance finds of physical cultural resources during excavation activities for new construction.

3.8.7 Stakeholder Engagement and Information Disclosure (ESS10)

Effective stakeholder engagement improves the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation. The proposed project has engaged stakeholders as per SEP developed for HEET project. The engagement will cover all phases of the project. Implementing agencies will 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. *See chapter five for comprehensive Stakeholders Engagement Plan for this project.*

3.9 Environmental, Health and Safety General 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. 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 should 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 should be based on the professional opinion of qualified and experienced persons. Other World Bank instruments applicable to this Project are the following:

- 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.pd

CHAPTER 4: BASELINE ENVIRONMENTAL AND SOCIAL CONDITION

4.1 Introduction

This chapter describes the existing environmental setting of the proposed project and its immediate surroundings. This includes the physical environmental condition comprising air, water and land components, the biological environment and social – economic environment. Attributes of the physical environment like water, soil and noise quality in the surrounding area that were assessed primarily through analysis of sample collected from the field. Surveys were carried out to understanding, record the biological environment prevailing in the area, and were verified against published information and literatures reviews. The social-economic environment has been studied through consultations with various stakeholders in the area within the project site.

4.2 Components and Parameters for Baseline Environment Study

The various components studied as a part of the baseline study are discussed in the following sections components;

- Physical Environment (Air, Noise, Vibration and Water Environment)
- Biological Environment
- Socio-Economic Environment

4.3 Physical Environment

4.3.1 Climate

The climate varies from semi and warm tropical to cool high altitude tropical. The wet season is oppressive and mostly cloudy, the dry season is muggy and mostly clear, and it is hot year round. The project area of MU-Main Campus in Changarawe village falls within the broad climatic zone of hot and humid coastal tropical climate. This is a climatic zone which is attractive because of the higher attitude above mean sea level.

The establishment and functioning of MU-Main Campus facilities could bring about alterations in the regional climate as a result of heightened urbanization, modified land utilization, and the possible occurrence of deforestation or disruption to habitats. Specifically, the reservoir tank may influence nearby water systems and play a role in modifying hydrological patterns. Furthermore, elevated human activity and the expansion of infrastructure may lead to increased energy consumption, the generation of waste, and air pollution. It is crucial to take into account the social impact on the community, as the project has the potential to bring about both positive and negative outcomes, affecting local demographics, employment opportunities, and community dynamics.

4.3.1.1 Temperature

The hot season in Mzumbe ward lasts for 1.9 months, from January 15 to March 13, with an average daily high temperature above 92°F. The hottest month of the year for Mzumbe ward in Mvomero district is February, with an average high of 93°F and low of 75°F.

The cool season lasts for 3.5 months, from May 2 to August 18, with an average daily high temperature below 87°F. The coldest month of the year in Mzumbe is July, with an average low

of 67°F and high of 86°F (https://weatherspark.com/y/100618/Average-Weather-in-Mvomero-Tanzania-Year-Round).

The architectural and construction decisions for buildings will be shaped by the local temperature patterns, with particular attention to the prevailing climate conditions in the region. Whether it's extreme heat or cold, these temperature variations can impact the energy efficiency of structures, necessitating the implementation of suitable insulation and ventilation systems. Additionally, the well-being of occupants is influenced by temperature, leading to considerations such as the installation of air conditioning or heating systems. Furthermore, temperature fluctuations can affect the functionality and water storage capacity of the reservoir tank, influencing the overall sustainability and resilience of the project in the face of environmental conditions. A comprehensive evaluation of temperature-related factors is essential to ensure the prolonged success and adaptability of the proposed infrastructure in the specified location.

4.3.1.2 Precipitation

A wet day is one with at least 0.04 inches of liquid or liquid-equivalent precipitation. The chance of wet days in Mzumbe ward, Mvomero District varies very significantly throughout the year.

The wetter season lasts 6.4 months, from November 7 to May 18, with a greater than 36% chance of a given day being a wet day. The month with the most wet days in Mzumbe ward, Mvomero District is April, with an average of 18.9 days with at least 0.04 inches of precipitation.

The drier season lasts 5.6 months, from May 18 to November 7. The month with the fewest wet days in Mzumbe ward, Mvomero District is July, with an average of 2.2 days with at least 0.04 inches of precipitation.

Among wet days, we distinguish between those that experience rain alone, snow alone, or a mixture of the two. The month with the most days of rain alone in Mzumbe ward, Mvomero District is April, with an average of 18.9 days. Based on this categorization, the most common form of precipitation throughout the year is rain alone, with a peak probability of 66% on April 19 (https://weatherspark.com/y/100618/Average-Weather-in-Mvomero-Tanzania-Year-Round).

4.3.1.3 Rainfall

Mzumbe ward in Mvomero District experiences extreme seasonal variation in monthly rainfall.

Rain falls throughout the year in Mzumbe ward, Mvomero District, the month with the most rain in Mvomero is April, with an average rainfall of 7.2 inches.The month with the least rain in Mzumbe ward, Mvomero District is July, with an average rainfall of 0.5 inches (https://weatherspark.com/y/100618/Average-Weather-in-Mvomero-Tanzania-Year-Round).

Rainfall can impact various project aspects, like construction, water management, and the ecosystem. Excessive rain during construction may cause delays, soil erosion, and infrastructure damage. The reservoir's efficiency must align with regional rainfall for a sustainable water supply. Environmental and social impact assessments (ESIA) address local concerns, including changes in water flow, soil erosion, and structural resilience to weather challenges. Integrating mitigation

and adaptation measures into project planning is crucial for minimizing adverse effects on implementation and long-term sustainability.

4.3.1.4 Humidity

Mzumbe ward in Mvomero District experiences significant seasonal variation in the perceived humidity. The muggier period of the year lasts for 9.7 months, from September 11 to July 1, during which time the comfort level is muggy, oppressive, or miserable at least 77% of the time. The month with the most muggy days in Mzumbe ward, Mvomero District is December, with 31.0 days that are muggy or worse.

The month with the fewest muggy days in Mzumbe ward, Mvomero District is August, with 22.1 days that are muggy or worse (https://weatherspark.com/y/100618/Average-Weather-in-Mvomero-Tanzania-Year-Round).

The assessment for the proposed development in MU-Main campus highlights the significant role of humidity, particularly in construction and maintenance challenges. High humidity, common in the region, can lead to structural issues and affect indoor air quality. Design and material selection, along with effective ventilation, are crucial for long-term project success in the specific climatic conditions of the area.

4.3.1.5 Wind

The average hourly wind speed in Mvomero District experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 6.4 months, from April 28 to November 9, with average wind speeds of more than 7.2 miles per hour. The windiest month of the year in Mvomero is September, with an average hourly wind speed of 8.6 miles per hour.

The calmer time of year lasts for 5.6 months, from November 9 to April 28. The calmest month of the year in Mvomero is March, with an average hourly wind speed of 6.1 miles per hour

The predominant average hourly wind direction in Mvomero varies throughout the year. The wind is most often from the east for 1.9 months, from February 14 to April 10 and for 4.3 months, from August 16 to December 26, with a peak percentage of 88% on November 3. The wind is most often from the south for 4.2 months, from April 10 to August 16, with a peak percentage of 85% on June 6. The wind is most often from the north for 1.6 months, from December 26 to February 14, with a peak percentage of 54% on January 1 (https://weatherspark.com/y/100618/Average-Weather-in-Mvomero-Tanzania-Year-Round).

The wind is a crucial factor in the environmental and social impact of proposed infrastructures at MU-Main Campus. Considerations include wind load on structures, dispersion of pollutants, and effects on ecosystems. The design and construction of various facilities must account for local wind patterns for safety. Wind may also impact airborne pollutant dispersion and require erosion control measures in landscape planning for environmental protection.

4.3.2 Soil and Geology

Mzumbe ward characterized by flat alluvial plains with homogenous sedimentation pattern. Major soils are imperfectly to poorly drained, deep, dark grey or grey brown, often mottled clays (clay 40-70%), more compact and contain fewer sandy strata. Natural fertility status is low to moderate. For instance, the Mgongola plains in Kambala, Dakawa in Mvomero Division possess the characteristics. The soils of these types normally lie on the altitudes ranging from 400 – 500m above sea level.

Physiographic units range from well drained, level to rolling plains at low altitude (200- 500m) to strongly dissected uplands and low hills transitional to mountains at altitude 500 – 1000 m; mainly developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with moderate to very low natural fertility (Covers parts of Mzumbe, Mlali and Mvomero Wards). *(Source: Strategic Plan for Mvomero District Council, 2015).*

Taking into account the geologic specificity issue at local scales, there is a need of detailed geotechnical surveys prior to construction of any of the proposed establishments of new buildings. Identification of soil types, soil bearing capacity, coefficient of linear extensibility (COLE) and level of erosion should be critically analyzed in order to construct appropriate types foundations in specific proposed establishment of building structures.

4.3.3 Vegetation

The district is divided into the following ecological zones

i. Highland and Mountains Zone:

The zone occupies about 25% of the district area extending on Nguru Mountain Ranges (Mtandao wa Milima ya Unguru). This zone lies within altitude of 1200-2,000m above sea level. The major occupations in this zone are Agriculture, Horticulture and marginal Livestock keeping. Therefore, the zone is very potential for growing field crops, cash crops, spices, fruits and vegetables.

ii. Miombo Woodland Zone

The zone occupies about 20 % of the district area with low flat lowland physical features. The zone lies within the altitude of 600 - 1,200m above sea level. Average annual rainfall is between 600 and 1,200mm. The major occupations in this zone are Agriculture, Livestock, National Parks, and Forestry. This zone is the best for optimum use of agriculture production and livestock grazing.

iii. Savannah River Basin Line

This zone extends alongside the great rivers of Mkata, Wami, Mgeta, Mlali, Divue, Diburuma, Mkindo and Mburumi. The zone is potential for irrigation, dry season cultivation, production of paddy, sugarcane, cotton, vegetables and fishing.

Table 4.1: Agro ecological Zones at Mvomero District

S/N	Zone	Terrain	Vegetation
1	Highland and Mountains	Mainly mountainous, undulating to hilly plateau crests Rocky terrain very strongly dissected mountain block	Shrubs, grass, planted trees

2	Miombo Woodland	Gently undulating to rolling plains and plateau level to rolling plains	Woodland, grass land, shrubs
3	Savannah river Basin line	Flat to rolling plains Flat alluvial plains with homogeneous sedimentation pattern	Grasses and planted trees

Source: Mvomero District Council 2017

The main type of existing secondary vegetation cover at MU-Main campus is scattered bushes which are found in the western and southern part of the area. This type of vegetation does not limit the proposed spatial expansion of MU. Planted trees are also found more prominently on the far eastern side of the site emanating from the main gate. This vegetation needs to be conserved for environmental considerations and aesthetic values of the University.

4.3.4 Hydrology and Topography

The district has eleven permanent rivers namely Mjonga, Divue, Mvaji, Mkindo, Diwale, Mburuni, Dikurura, Mbakana, Mgeta, Tangeni and Ngerengere. There are also few seasonal dams and ponds, providing water for livestocks and sometimes water for irrigation schemes.

The larger part of MU - Main campus site is characterized by gently sloping land and the whole site is sloping toward the north. Generally, the whole area is suitable for all kinds of development and it does not need additional costs in terms of grading for construction of houses and infrastructure facilities.

4.4 Environmental data of the proposed site and the surrounded community

This includes measuring recommended parameters to be used as a baseline for monitoring practices during project construction and operation phases. For our proposed project, baseline measurement will consider air quality measurement for particulate matter and gaseous emission, noise level measurement and water quality analysis.

4.4.1 Baseline Data on Air Quality, Noise and Vibrations

The ambient air quality was monitored in the impact area as per air quality monitoring guidelines. The study area represents per urban environment. The prime objective of the baseline air quality study was to assess the ambient air quality of the project area.

4.4.1.1 Ambient pollutant gases

Levels of ambient pollutant gases were measured in line with manufacturer's procedure and ISO 11042-1: 1996(E) protocol that meet the European standards (say EN 61779, EN 50104 and EN 45544). Generally the results show that all measured noxious gases concentrations for all sites of the proposed project were within permissible limits corresponding to limits prescribed by Local Standard (TBS limits) and international limits (WHO/IFC limit) for ambient air quality (see appendix 2).

4.4.1.2 Dust (Particulate matter) concentrations in terms of PM_{10} and $PM_{2.5}$

Dust levels were measured using Particulate Matter/Dust Monitor that complies with the EMC

Directive 89/336/EEC of the European Union in accordance to manufacturer procedure and applicable local standards and/or international environmental guidelines. The device has been tested according to the standard delivery schedule and complies with the EN 50081-1:1992 and EN 50081-2:1993 standards. Based on the results, all recorded data for PM_{10} and for $PM_{2.5}$ were within the standards prescribed by TBS and IFC/WB Group limits at each location (Appendix 3).

4.4.2 Noise and Vibration Environment

4.4.2.1 Noise levels

Noise data were recorded at the same stations used to measure ambient pollutant gases, dust and one offsite point were recorded. At each station, noise levels were measured in accordance to ISO 1996-1:2003 using a Digital Sound Level Meter, with measurement range of 30 to 130dB (A). Based on findings, the average noise level indicate that the existing status of the project area and the nearby community are within the acceptable noise levels prescribed by WB/IFC limit and TBS limit (Appendix 4).

4.4.2.2 Ground Vibration

The ground vibration levels measured were compared with Occupational Safety and Health (Working Environment) Regulations, 2016 limit of 5 mm/s PPV. Also, the results were compared with British Standard of 0.3mm/s and 0.15 mm/s PPV (Peak Particle Velocity) as levels that human beings and/or animals can detect or may experience stress resulted to vibrations. The vibration of the area is insignificant as it did neither exceed the 0.15 mm/sec PPV criteria established to evaluate the extent that can easily be detected by human nor exceed 5 mm/sec PPV criteria established for conducive working environment for a person at work (Appendix 5).

4.4.3 Water Quality Analysis

The aim of this is to ensure safety, sustainability, and effective management of this vital natural resource for both human and environmental well-being and understand the various physical, chemical and biological characteristics of the water. This analysis helps in determining the suitability of the river water for different purposes and identifying any potential risks or contaminants present. At MU water were analyzed but it deviates slightly from standard limits and the results appended on appendix 6.

4.5 The Biological Environmental

4.5.1 Flora and Fauna

The proposed area for project implementation has no variety of plants species except only grasses such as Rhodes grass (*Chloris gayana*), Star grass (*Cynodon dactylon*), and few trees (*Eucalyptus)* were observed. During general searches it was observed that there is no species of the amphibians and reptiles that are included in the IUCN Red list of threatened species.

4.5.2 Unique and Endangered species

There are neither unique nor endangered species of concern that were observed during site assessment at MU-Main campus in Changarawe village.

4.6 Existing infrastructure and Social Issues at MU

4.6.1 Academic Infrustructures

The academic infrustructures at MU includes lecture halls, lecture theatres, classrooms, computer laboratory rooms and library. The University has two lecture halls with capacity to accommodate 1,252 students. These are New Assembly Hall (NAH) formally called Samora and the Old Cafeteria formally called Chabruma, and there are four lecturer theatres with capacity to accommodate 755 students, there are three computer laboratory rooms with capacity to accommodate 217 students and there is one library with capacity to accommodate up to 780 readers at a time. Also there are Open air study junction that has been developed at the area between play grounds and classrooms.

Hence, the present academic physical infrastructure at the MU-Main campus does not support the existing enrolment of undergraduate and postgraduet students.

4.6.2 Students Hostels

The University has a total of 12 halls of residence at the Main campus and 2 areas whose houses were converted from staff residential to hostel. The areas whose houses were converted from staff residential to hostel are Vikenge A-K and Ex Staff Quarters. Both halls of residence and hostel have capacity to accommodate 2,558 students. Apart from efforts that have been used to convert staff residential houses to provide accommodation for students, there is a need to provide space for construction of additional halls of residence to cope with increased demand for Mzumbe university academic programs.

4.6.3 Staff Residential Houses

The available staff accommodation does not cope with the growth of the University. MU-Main campus provides accommodation for few academic and administrative staff. The university has 115 Grades - A residential houses and 250 Grade - B residential housesmaking a total of 365 residential houses for both academic and administrative staff. However, the University has employed 279 academic staff and 192 administrative staff making a total of 471 staff. Therefore, there is a need to provide space for construction of additional staff houses to cope with the increased employment at the university.

4.6.4 Cafeteria and Staff canteen

The MU-Main campus has only one cafeteria called Luthuli with a capacity to serve 300 students in one seating. The second cafeteria called Chabruma (Old Cafeteria) with seating capacity of 405 students was converted into a lecture hall. Also, the University has one staff canteen called Mzumbe Club, it provides food and soft drinks in the afternoon to the general public of MU.

4.6.5 Sports Facilities

The University has several sport facilities for recreation at the main campus. They include two football pitches, one lawn tennis, a basketball pitch and a volleyball court.

4.6.6 Health services

The Mvomero District council oversees 3 hospitals - 1 government-owned, 1 private, and 1 Roman Catholic - alongside 4 health centers and 53 dispensaries. Their goal is to ensure accessible healthcare, particularly for vulnerable groups, focusing on prevention and treatment (Source: Mvomero District Council, 2017).

The University Health Centre, equipped with 21 beds, caters to students, staff, and the local community, offering various medical services including consultations, family planning, and minor surgeries. Referrals to larger medical facilities may occur if needed. Students and staff must enroll in the National Health Insurance Fund for coverage. Proposed facilities at the university aim to enhance nutrition, well-being, and learning environments, though construction may temporarily impact nearby communities, requiring mitigation measures for noise and environmental stressors.

4.6.7 Gender issues at MU

Gender inequality is a significant issue within Tanzanian society. Efforts have been made to address this by introducing the Gender Policy (2008) and the Anti-Sexual Harassment Policy (2015). The Gender Unit at MU plays a crucial role in integrating gender concerns into the university's core activities and providing guidance and counseling services. The establishment of the Students Gender Club at MU aims to empower and raise awareness among students about gender-related matters.

Gender-related challenges also affect MU students. During the annual orientation week for new students, the Gender person at MU highlighted some of these issues. She noted that many female students hesitate to participate in elections for various leadership positions due to a lack of confidence, perceiving male students as superior, and social discouragement stemming from the belief that most significant roles within the MU student government are held by males. Though in 2022/2023 there is big changes in MUSO government due to the presence of female as a MUSO president. Other problems mentioned included instances of sexual harassment, sexual misconduct, verbal abuse, and substance abuse.

To actively promote gender equity and integration, MU is presently revising its Gender Policy. The revision involves several key strategies: i) Ensuring admission of talented students without gender bias, ii) Implementing affirmative actions to increase the representation of disadvantaged groups in priority programs, iii) Guaranteeing gender balance, equality, and fairness in university policies related to teaching, research, consultancy, and public services, iv) Ensuring equality,

diversity, and fairness in student enrollment, staff recruitment, and professional growth, and v) Advancing gender equality in governance and management structures.

4.6.8 Traffic Incidents

MU faces a susceptibility to traffic incidents due to inadequate parking space for the current number of vehicles, leading to haphazard parking throughout the campus. MU has witnessed a substantial rise in vehicular activity, evident from the accumulation of motor vehicles across various campus sections due to unregulated parking. Socially, increased traffic and pedestrian traffic following construction activities and the subsequent use of new buildings can pose safety risks. The flow of construction vehicles, transportation of construction materials, and movement of construction workers can lead to congestion and the potential for accidents near the site, affecting the campus community and neighborhood the residents (Changaarawe, Vikenge and Tangeni villeges).

From an environmental perspective, the construction phase may disrupt existing traffic, causing temporary road closures or diversions. Heavy construction machinery and vehicles transporting materials to the site can cause soil erosion, dust emissions and noise pollution, which affects the surrounding ecosystem including increased traffic on area can lead to increased air pollution, adversely affect air quality and can cause respiratory problems in nearby people**.**

4.6.9 Water Supply

The existing main source of water supply at the MU-Main campus and the surrounded village of Changarawe, Vikenge and Tangeni is Tangeni river that is located about 9km from the University. This water is transmitted from the source to the elevated water tank from which it is distributed to the campus. However, the source is not sufficient to meet the existing demand of water consumption. This is manifested during the dry season when there is water rationing.

On a positive note, the project includes the installation of reservoir tanks, which can help improve water use. The presence of reservoirs increases the water supply, benefiting not only the university but also the residents from Changarawe, Vikenge and Tangeni village. Socially, increased demand for water in expanded areas can put pressure on existing water supplies, potentially affecting water availability for students, staff and communities. This increased demand can increase competition for water, potentially affecting the daily lives and activities of individuals in the community. Environmentally, the construction and operation of the proposed structures may affect local water quality. Potential runoff from construction activities, waste from pastures and compost facilities if not properly managed poses challenges to water quality.

4.6.10 Solid and Liquid waste Management

The University operates a system to handle both solid and liquid waste. Solid waste is overseen by the MU, with collection points conveniently placed across the campus. Liquid waste, or wastewater, is treated through on-site and off-site sanitation system On-site sanitation systems practiced in the campus consists of septic tanks, soak away pits, and pit latrines. Off-site sanitation

system through a sewerage network covers some few buildings and managed into the existing WSP.

The proposed establishment of buildings will strain the current treatment setup. Once finished, these buildings will rely on the existing wastewater treatment system at the MU, specifically utilizing the proposed two WSP to be established in the MU area. Hence, regarding this the generated wastewater from the proposed establishment will be treated well and the environmental pollution due to wastewater will be minimized.

4.6.11 Security

Security poses significant challenges at the university. The university has experienced several security incidents in the past, including thefts, vandalism, and unauthorized access to various buildings and facilities on campus. These incidents have raised concerns among students, staff, and stakeholders regarding the safety and security of the university premises. In addition to that, MU currently has two gates as the primary entry and exit points to the campus. However, the access control measures in place may not be sufficient to ensure proper monitoring and management of the flow of individuals entering and leaving the campus.

Hence, the proposed establishment of new buildings at MU through HEET project should provide an opportunity to install a comprehensive surveillance system throughout the campus, including CCTV cameras and monitoring stations, to enhance security monitoring and deter potential security threats. Also, should focus on implementing adequate and energy-efficient lighting solutions in and around the new buildings to create a safer campus environment during nighttime.

4.7 Socio-Economic Environment

The Socio-economic aspects that were studied in the project area included;

4.7.1 Demographic profile

In the last national census of 2022 Mvomero District had 260,525 people of which 131,256 were male and 129,269 were male. Mzumbe ward had total of 19,677 people of which 9462 were male and 10255 were female. (Source; NBS, 2022). The establishment of proposed buildings at MU may lead to an influx of people to the area, either as workers or due to increased opportunities associated with the project. This could impact local infrastructure, services, and social dynamics.

MU has the current population of 9,000 students in 2022 that has been projected to 80,400 students over the next 13 years, in 2035. With this population projection, the University employ about 471 staff including both academic and administrative staff and is expected to employ about 2,981 over the next 13 years, During the construction phase the university area the population will increase due to different migration of contracted workers and also after the more student and worker will increase due to the accomplishment of the project.

Fortunately, the project has the potential to improve educational systems, provide better outcomes for students and potentially improve the overall learning environment. Additionally, the construction of cafeterias and reservoirs can help improve the quality of life for campus residents. On the negative side, the construction and operation of these structures can lead to environmental degradation and displacement of local communities. Infrastructure development could alter the social cultural network of Changrave, Vikenge and Tangeni village, potentially causing problems and challenges for residents.

4.7.2 Cultural Heritage, Aspirations and Traditions

The dominant culture for the communities of Mvomero district particularly Mzumbe ward is the Swahili culture. The main indigenous ethnic groups are Nguu (Walukungwi), Zigua and Luguru tribes which is equivalent to 81% of the total population in Mvomero District. Other tribal groups of the Bantu origin who migrated into the district are Makua, Chaga, and Sukuma and Nilo Hamitic which include Maasai and Mang'ati.

It is expected that much of the unskilled labour force for the construction activities will be sourced from surrounding areas of Mzumbe ward. This is because most of the people from these areas are from low socio-economic status.

4.7.3 Education

a. Primary Education

Mvomero District Council has a major role of providing education including Pre- primary, Primary, Secondary and also post primary level of schooling. There are 142 government primary schools offering pre and primary education with a total of 60,377 pupils (boys 29,948 and girls 30,429, 1362 teachers, 775 classrooms, 227 teacher's houses and 11,026 desks.

Also, there are five centers in five primary school offering Special Education to pupil with special needs. Total number of pupils is 146 (boys 83 and girls 198). There are 17 Complementary Basic Education Centre (COBET) with 408 pupils. (Boys are 210 and girls 198).

Mzumbe ward and associated villages are committed to provide equal and quality education to all school aged children in Mzumbe, Changarawe, and Vikenge primary school . Despite of the effort made by the government and Council in general, there are some constraints encountered including shortage of 884 classrooms, 1,471 teacher's house and 12,974 desks especially in Mzumbe primary school which located near MU.

b. Secondary Education and Institutions

Mvomero District Council has 24 secondary schools which 21 are community based secondary school, 1 Government boarding secondary school and 2 non-Government secondary schools.

There is also 1 Teachers Training College at Mhonda and 1 higher learning Institution namely MU. In Mvomero District the total number of secondary school students is 17,073, teachers are 420 and 33 non-teaching staff.

In achieving the Education Policy goals, the district strategy is to ensure that all selected students are enrolled and complete secondary education. The laid down initiative is to ensure that there is proper allocation of resources which will enable to improve the current teaching and learning situation in our secondary school s by creating conducive teaching and learning environment for teachers and learners.

Mzumbe ward strategy among other thing is to ensure that there are enough school infrastructures i.e., an increase of number of classroom and teacher's house, toilets, procurement and supply of teaching and learning materials and chemicals. This includes number of girls" hostel and construction of science laboratories (Phase wise).

4.7.4 Employment

The district economy depends mainly on agriculture particularly on crop production. The district has 549,375Ha, of arable land for Agriculture but currently only 247,219Ha are effectively utilized, this is equivalent to 45% of the arable land and 266,400 is suitable for animal husbandry. Agriculture is the main source of livelihood for most Mzumbe ward households due to presence of fertile soil and favourable climatic condition. It estimated that about 82 percent of the households are engaged in agricultural activities for both crop production and livestock rearing.

The common food crops which are cultivated are maize, Sorghum, Paddy, bananas, horticultural and leguminous products. Cash crops are sugarcane, Cocoa, Simsim, Sunflower, Paddy, Coffee and spices. Also, during site visit some area for the proposed establishment are used by surrounded community for agricultural activities. Hence, MU will provide and distribute other land to community of Changarawe, Vikenge and Tangeni Villages to conduct agricultural activities like maize cultivation etc as previous as a part of corporate social responsibility.

4.7.5 Occupational and Income

According to Village/Ward Executive Officer, most of the people in the project area involve themselves as either employed or self-employed. Some of economic activities involved in the project area are:

- Agricultural (farming and livestock keeping)
- Shops
- Accomodation sevices (Hostel, Lodge/Guest etc)
- Transportation services (Public buses (Daladala), and Motocycles (Bodaboda)
- Money Agents (Mpesa, Tigopesa, Halopesa and Airtel money)

These activities play a significant role to the Mvomero economy in terms of revenue and in provision of job opportunities to the residents. The proposed project will enhance the number of economic activities in Morogoro region to the National level.

4.7.6 Economic Infrastructure

a. Road network, Car parking and Accessibility

Mvomero district has a very poor road density because the network has got no required length. The district is crossed by a Dar-Dodoma Road as well as Dar-Iringa Road and thus enables motorcars to pass over throughout the year. This has played a big part in attracting investors to the district.

MU-Main campus is accessible from Morogoro town through a tarmac road known as Mzumbe – Morogoro Road which is passable throughout the year. Internal roads within the campus area many and are of murram surface and very few are of gravel type. Car parking is provided in some areas such as the administration block and academic buildings while others end within residential areas. The parking at the administration building, school and faculty buildings, and Lumumba complex are of tarmac surface while others are of gravel surface.

The proposed development at MU-Main campus can increase the availability of educational facilities, creating an appropriate learning environment. But service roads and parking can also feel increasing pressure, causing congestion and disruption to local infrastructure.

b. Energy and Power Supply

Electricity supplied in the district is through National Grid. 60% of all the wards of Mvomero are serviced with electricity. Other sources of energy are solar, biogas, kerosene, firewood and charcoal. MU receives its energy from public institution TANESCO power supply. The supply is sufficient to meet the existing demand. The TANESCO power distribution network along the Old Morogoro - Iringa Road will be used for connection at the main gate to meet the expected expansion of the University requirements.

The proposed project can support sustainable development by adding renewable energy sources, implementing energy-efficient technologies and improving overall local infrastructure. This reduces environmental footprint and improves energy adaptation. However, construction and operation can cause negative impacts, such as increased energy demand, potential ecological degradation, and changes in local resource use patterns.

c. Communications

The Changarawe village has a good mobile phone connection through Airtel, Vodacom, Tigo, Halotel and TTCL landlines services. Coverage of communication services is progressively extending to cover the whole village. The postal services used at the village are those available in Morogoro town which is 20km from the Changarawe village.

d. Financial Institutions

Financial services in Mvomero District are insufficient to cope with the growing populations and economic activities. NMB and CRDB are only Banks which provide financial services to the whole population. Mvomero District has two branches of National Microfinance Bank (NMB) located at Turiani and Dakawa, and there are also three CRDB Bank branches located at Mzumbe, Turiani and Dakawa. Non-Banking financial institutions also exist within the district to supplement financial services, such institutions include; saving and Credit Cooperative Societies (SACCOs),

village Community Bank (VICOBA) and mobile phone money services including M-Pesa, Tigopesa, Airtel money, Halopesa.

However, in terms of Banking services, there are three Banks that provide their services in Mzumbe. CRDB operates a branch at MU, offering a complete range of standard Banking services. The National Bank of Commerce (NBC) and the National Microfinance Bank (NMB) have installed Automated Teller Machines (ATMs) to offer teller services.

CHAPTER 5: STAKEHOLDER ENGAGEMENT PLAN AND AND GRIEVANCES REDRESS MECHANISM

5.1 Introduction

This chapter gives an overview of the stakeholder engagement efforts conducted thus far including the process of identifying stakeholders. It highlights the stakeholders who have been identified and consulted, the methods used for consultation, and the concerns and issues raised by stakeholders regarding the construction activities of various facilities at MU and conclude with a review of how these issues have been addressed. The primary objective of stakeholder engagement is to outline how MU will involve stakeholders throughout the development of the proposed project.The Environmental and Social Framework (ESF) of the World Bank incorporates Environmental and Social Standard (ESS) 10, titled "Stakeholder Engagement and Information Disclosure." This standard acknowledges the significance of transparent and open communication between the Borrower and project stakeholders as a crucial aspect of international best practices. ESS10 underscores that successful stakeholder engagement can greatly enhance the environmental and social sustainability of projects, boost project acceptance, and play a vital role in the effective design and implementation of projects.

The Engagement activities associated with the Environmental and Social Impact Assessment (ESIA) offers an opportunity for all individuals who are interested in or affected by the project to express their opinions and concerns regarding the project's impacts and mitigation measures. The project will consider and respond to these inputs during ESIA process. Furthermore, the engagement activities enables the relevant authorities to ensure that concerns and comments from various stakeholders are taken into account while developing Environmental and Social Management Plan (ESMP) and an Environmental Monitoring Plan for the project. Stakeholder consultation will continue during the disclosure of the ESIA report and throughout the implementation of the proposed project.

5.2 Stakeholders Identification and Analysis

Stakeholders include all individuals, groups or organisations that might be affected or might affect the proposed project (positively or negatively) in one way or the other. A Public consultation process has been conducted during the scoping report preparation for the proposed project to be located within MU at Mzumbe ward, Changarawe village. This process allowed the creation of a channel of communication for consultation from the local and national level. National and local authorities including leaders in the area of influence of the project have been involved in the process.

The consulted stakeholders are found at Regional, District and local levels. At district levels consultant meet with District Environment Management Officer, Town planning officer and community development officer. At the ward level, MU (Staff, Students and Services providers), Mzumbe Ward Executive Officer (WEO), Changarawe, Vikenge, and Tangeni Village officials were consulted. In addition, interview was held with the health and safety inspectors at Occupation

Health and Safety Authority (OSHA), Fire and Rescue Force office, Morogoro Water Supply and Sanitation Authority (MORUWASA), Rural Water Supply and Sanitation Authority (RUWASA), Wami/Ruvu Basin Water Board, TANESCO, NGOs and CBOs.

Table 5.1: List of Stakeholders identified, their roles and the rate of interest in the Project

Authority	Role of the stakeholder	Rate of Interest
Morogoro Regional Administrative Secretary	Political and administrative issues	**HIGH**
Mvomero District Council	Overall advice on both professional works (land, Planning, environments, social, economics) with regards to the execution of the project at MU-Main Campus	**HIGH**
Mzumbe Universities (MU)	Provides advice on all work-related safety measures to the project	**LOW**
Occupational Safety and Health Authority (OSHA)	Oversees the provision, availability and control of power in the project area at MU-Main Campus and the surrounding communities of Mzumbe ward	**LOW**
Tanzania Electricity Supply Company (TANESCO	Power supply	**HIGH**
RURAL Water and Sanitation Agency (RUWASA)	Plan, design, construct and supervise rural water supply projects	**LOW**
Fire and Rescue Force	Oversee fire risk and hazards associated with the project	**LOW**
TTCL	Data provider	**HIGH**
Mzumbe Ward (Changarawe, Vikenge and Tangeni village)	Beneficiaries of the MU-Main Campus in Mororgoro Region	**HIGH**
NON-STATE ACTORS (NGOs, CBOs, FBOs) and PRIVATE SECTOR	Employment opportunities associated with project	**HIGH**
MUSO	Building users	**HIGH**
MU staff	Building users	**HIGH**

5.3 Requirement of Stakeholder Engagement

According to the Environmental Management Act Cap 191, the Environmental Management (Environment Impact Assessment and Audit) (Amendment) Regulations of 2018, and the World Bank ESS10 (Stakeholder Engagement and Information Disclosure), its necessary to include Stakeholder Engagement and Information Disclosure as integral parts of project planning and implementation in order to develop good relationships and gather their views on issues that could affect the project throughout the project life.

The Environmental Management (Environment Impact Assessment and Audit) (Amendment) Regulations of 2018 along with the ESIA emphasize the importance of stakeholder engagement and provide the guidelines on when and how the public should be notified during key stages of the ESIA process. Specifically, stakeholder engagement is required during the ESIA Scoping stage and

after the completion of impact analyse. The project proponent is also obligated to inform the public at the commencement of scoping activities and upon submission of the Draft ESIA to NEMC (National Environmental Management Council).

5.4 Objectives of Stakeholder Engagement

The general objective of the Stakeholder Engagement Plan (SEP) is to guarantee a consistent, through, coordinated and culturally suitable approach to engaging stakeholders and disclosing project information. The objective is to showcase the commitment of the MU to following internationally recognized best practice in engagement. Following the standards of current international best practices, the stakeholder engagement for this project seeks to ensure that the engagement process is conducted without manipulation and interference. MU is fully dedicated to adhering to Tanzania national environmental policy and legislation, and World Bank Environmental and Social Policy.

This Stakeholder Engagement plan identifies the key stakeholder and establishes effective mechanisms for obtaining stakeholder feedback and demonstrates how it will be integrated into the broader ESIA process. The plan ensures that concerns raised by key stakeholders are addressed both in the ESIA and during project decision making and design phase. It also serves as a documentation of the engagement process and outlines the responsibilities of the project proponent in accordance with Tanzania legislative requirements and international best practices. Considering this context, the specific objectives of this stakeholder engagement plan are as follows;

- Provide relevant, timely, accessible and appropriate information regarding hydroelectric power plant related developments, in an appropriate manner and understandable format to all stakeholders. Information will be disclosed as early and as comprehensively as possible.
- Consult stakeholders on their opinions, concerns, preferences and perceived gains and risks with respect to the project planning and implementation, including the design and proposed management and mitigation measures to reduce potential impacts and to enhance possible benefits.
- Provide all stakeholders with the means to address concerns and grievances with the project, in a structured, reliable and responsive manner.

5.5 Stakeholders Engagement and Disclosure Methodologies

Various communication techniques are employed during stakeholder engagement. Essentially, community meetings serve as the primary methods for involving the public, other method are focus group discussion and interview. These methods are utilized to generate initial awareness, encourage participation, and facilitate long-term information sharing. However, the selection of specific methods depends on the level and purpose of engagement, as well as the specific stakeholder group being targeted. In the ESIA process, the ESIA Consultants employed the following methods to engage the public.

5.5.1 Community Meetings

This method facilitates sustained information exchange between the proponent and the relevant public, including women and vulnerable groups. Community meetings were organized to disseminate information to individuals who could potentially be impacted by the project, as well as to gather their comments and address any queries they may have. These meetings involved a presentation followed by a session for questions and answers. The main goals were to clarify the project details and seek opinions regarding both positive and negative impacts of the project.

5.5.2 Formal Meetings

Formal meetings with elected officials and government functionaries were held to provide information about the project to agency representatives, and to solicit their comments and questions. The meetings consisted of a short formal presentation followed by a question-and-answer period.

5.5.3 Focus Group Discussions

MU employed FGD when aiming to bring together stakeholders with the same interests or common characteristics into a meeting to discuss specific topics or project components in a focused manner. FGD was employed to explore issues that were relevant to specific groups or sub-groups of a community – such as youth, the elderly, women, students, and people with disabilities. The intention of using this approach was centered upon establishing similarities and differences among people of the same or different groups.

5.5.4 One on one interviews

The interviews aimed to give a chance to individuals to air concerns on the project and involved Project Affected Persons (PAP) and Other Interested Parties (OIPs) depending on the issues to be addressed.

5.5.5 Site visits

These visits are focused to identify and discuss stakeholder concerns and to disclose project information within communities.

5.5.6 Disclosure

- MU will made accessibility of ESIA report, along with other pertinent project documents to the public.
- The complete set of documents will be physically accessible in local offices and project offices. Electronically copies will be available on the MU website.
- Summary information will also be provided at Ward and Village offices situated in the project area.

Table 5.2; Summary of Stakeholders Communication methodology

S/N	Stakeholders Group	Language	Communication means
1	Government Institutions and Agencies (TCU, OSHA, TANESCO, MORUWASA, RUWASA, FIRE)	Kiswahili & English	o Phone and Email o Meetings o Roundtable discussions
2	Local government (Mvomero District Council, Mzumbe ward, Changarawe, Vikenge and Tangeni village)	Kiswahili	o Community Meeting o Roundtable discussions
3	MU student and disabled people	Kiswahili & English	o Roundtable discussions
4	MU Staff (Administrative and Academic staff, and Service provider)	Kiswahili & English	o Phone and Email o Meetings o Roundtable discussions
5	Vulnerable Groups (women, youth and elders)	Kiswahili	o Community Meeting o Roundtable discussions
6	Others (NGOs, CBOs, and private sector etc.)	Kiswahili & English	o Phone and Email o Meetings o Roundtable discussions

5.6 Stakeholders Concerns

Generally, all government all consulted stakeholders consulted had no objections regarding the proposed project and appeared to be content with its objectives leading to its initiation. They all urged the proponent to abide by the relevant rules and regulations guiding her project operations. All raised issues from consulted stakeholders are pointed and noted as explained on Table 5.3.

Table 5.3: Details of Stakeholders concerns

Level	Institution/ Group	Views and Concerns of Stakeholders	Response to Concerns
National Level	**Tanzania Commission of Universities (TCU)**	o Building should be well designed to reduce and avoid environmental pollution like noise, air and vibration pollution. o The contractor should deploy dust suppression and mitigation measures such as regular sprinkling of water and scaffolding at the site to minimize on dust pollution. o Building construction and their design should consider access for disabled people and their necessary facilities. o The proponent should take into account issues of waste management for both solid, liquid and hazardous waste.	o The design consultant group shall incorporate and revise all the addressing concerns in the drawings in order to enhance their functionality. o MU management shall cooperate with contractor to develop a plan that ensures that dust generated during construction activities are well managed. o MU shall treat wastewater into septic tanks, soak away pits, pit latrines and the existing WSP and ensure that all problems associated with waste water generation are treated and well managed. Also, the solid waste generated are collected and managed by MU through open air burning, open pit dumping, open land dumping and the proposed composting facility.
Regional Level	**TANESCO**	o In power supply they can opt for single dedicated line from substation direct to the MU. o A well-qualified electrical contractor should be used for electricity supply installation for the proposed establishment of new infrustructures.. o The project should consult TANESCO at the earliest stage possible in order to request for extension of services to new buildings and additional supply of electricity, if needed.	o The proponent should install single line from substation if its within their budget to solve the problems associated with the shortage of electricity. o MU shall award the competent electrical contractor for their proposed establishment of new infrustructures. o The Contractor should adhere to details of the architect designs. o The design group shall incorporate and revise all the addressing concerns in the drawings in order to enhance their functionality.
	OSHA	o The proponent should make sure the project is registered under the Workplace Information Management System (WIMS)	o MU and Contractor should register the proposed establishment of new buildings at OSHA. o Medical check-ups (Pre and Post medical) for the new employee and laboures will be done and

Level	Institution/ Group	Views and Concerns of Stakeholders	Response to Concerns
		before pre- construction and construction phases. o Medical examination should be done to all workers before and after construction and operation phases as well as during operation phase. o There should be trained First Aiders at all project phases, as well as First Aid Kits with all necessary facilities. o The proponent should make sure that the awarded Contractor should have registered HSE representatives o Conducting Health and Safety training and awareness programs. o The proponent should conduct Risk Assessment before construction and prepare a Risk Assessment report. o The proponent should prepare the Occupational Health and Safety Policy both in English and Swahili languages, and it should be displayed in an accessible place within a work place. o All workers should be provided with sufficient Personal Protective Equipment (PPEs) during all project phases. o The proponent should ensure temporally or portable toilet are in place within the project site if the existing toilet facilities are distant from the proposed project site. o The site area should have a provision of changing room.	workers shall be tested their health as per OSHA regulations. o MU and Contractor shall ensure that first aid and trained first aiders are in place for the proposed project. o Contractor should have registered HSE representatives. o MU and contractor should have health and safety management plan to ensure safety of workers within the project area. First aid kits shall be provided in an area where it will be easily visible and accessible. o Contractor should provide induction training to workers on health and safety and the appreciation of safety gear will be done. o MU and contractor should explain the nature of the project to the surrounded community and people living within the project area. o Risk assessment report is a part of ESIA report. Hence Contractor should conduct risk assessment. o Personal Protective Equipment (PPE) must be supplied due to the inherent nature of construction tasks and the associated hazards. o Contractor shall construct and design area for workers to change the clothes and other stuff during project implementation. o Contractor shall construct and design area for workers to change the clothes and other stuff during project implementation.

Level	Institution/ Group	Views and Concerns of Stakeholders	Response to Concerns
	Fire and Rescue Force	○ Architecture drawings should be submitted to fire office for approval before the commencement of the construction. ○ Fire drilling should be conducted at least twice a year. ○ Proponent must install the exit signs throughout the project site and a fire assembly point. ○ Fire detections system must be provided. Its components such as smoke detectors, heat detectors, beam detectors, sounders, beacons, manual call points, control panel, alarms and others must be in acceptable standards. Installation should be done by recognized and qualified institution. ○ Adequate Portable Fire Extinguishers must be provided, installed properly and maintained in accordance with acceptable standards by authorized personnel during all phases of the proposed project. ○ The Proponent should make sure workers are provided with firefighting trainings.	○ The Contractor should adhere to details of the architect designs. ○ MU should adhere this in order to ensure compliance and avoid unnecessary incident or accident. ○ MU should award contractor with registered electrical engineers. ○ The design group shall incorporate and revise all the addressing concerns in the drawings in order to enhance their functionality. ○ The design group shall incorporate and revise all the addressed concerns in the drawings in order to enhance their functionality.
	RUWASA & MORUWASA	○ The office is positive with the implementation of the proposed establishment ○ It could be good if the surrounding community will also be given access to water after rehabilitation of the water supply systems	○ MU shall enhance water availability for the project activities. ○ MU shall provide and distribute water to the surrounding community if water is available all the time.
Local Level	**Mvomero District Council** (DED, Environmental Management Officer,	○ The project is very positive to bring development in the Mvomero district in different aspects of education and gradual change of economic	○ The proponent shall conserve and protect environment within the project area and the surrounded village especially at water intake area in Tangeni village.

Level	Institution/ Group	Views and Concerns of Stakeholders	Response to Concerns
	Town Planning Officer, Community Development Officer)	○ Conserve the environment at the water intake and also prepare a program that will conserve the environment at the intake. ○ Clearance should be done only on the proposed establishment areas in order to minimize cutting of trees and other vegetation. ○ Teach students strategies for securing employment after completing their university studies. ○ The proposed project may increase pressure on social services which led to high price of other services like food, hotel etc. ○ Safety of workers and community should be considered during construction phase. ○ Sensitisation and trainings on finance management should be given to laborers. ○ Employment priority should be given to the local community surrounding the project for both skilled and unskilled labor. ○ During construction safety must be enhanced and health education e.g., HIV&AIDS and COVID19. ○ It is a nice project and gender balance will be observed during the construction phase ○ The development will take place within the university Campus and the land already belong to MU.	○ The proponent shall make sure that clearance will be done on the proposed establishment. ○ The proponent shall provide enterprenuership skills to their students to minimize large number of unemployed persons after university periods. ○ The proponent and contractor shall raise and sensitize awareness on HIV/AIDS transmission. ○ The contractor shall provide and enhance health education eg HIV&AIDS and COVID19. ○ The proponent and contractor should promote knowledge transfer and technological advancement. ○ The proponent and contractor shall provide employment for local residents for both skilled and unskilled labourers. ○ The contractor shall consider gender balance in provision of employment during construction phase.
	Ward Office- Mzumbe ward and Village offices	○ Project should provide employment opportunities to the local people.	○ The proponent and contractor shall provide employment for local residents both skilled and unskilled labourers.

Level	Institution/ Group	Views and Concerns of Stakeholders	Response to Concerns
	(Ward Executive Officer, Village Executive Officers, chairmen, Community Development Officer, Health and Environmental officer, community representative)	o Integrate the component of Corporate Social Responsibility (CSR) to the proposed establishment. o Interaction between/among the workers, students and the community can cause an increase in sexual conflicts and moral erosion o The payments for laborers should be done timely and fairly. o The water project between MU, RUWASA and Changarawe village should implemented as per the agreement. o The proponent should treat bodaboda riders around MU fairly, they should not be punished for not having reflectors. On the other hand, MU should sell the reflectors at affordable prices (Tshs 9500/=.maximum) o The contractor should use hire the youth around Mzumbe ward for catering service and other unskilled and semiskilled labor. o There shoul be equal access to health services at Mzumbe hospital (MU – Students, Staff & other service providers, and people from Mzumbe ward community) to reduce death rates for children and pregnant women. o The proponent should engage local community members or leaders in any meeting regarding the project. o The unskilled labourers should sign contracts which spell out their responsibilities and rights including payments.	o The proponent and contractor shall raise and sensitize awareness on the impact associated with the project regarding social issues. o The proponent shall ensure the contractor provides contracts to the workers and payment be prepared within the required time. o The proponent shall make a follow-up on the water project between RUWASA and Changarawe village as per the agreement. o The proponent shall handle bodaboda riders around MU in proper ways. o The proponent shall provide and distribute water to the surrounding community if there will be adequate water all the time. o The proponent shall ensure equal access to health services at the hospital; and good services to students, staff and persons from the surrounding villages. o The proponent shall engage local leader in any meeting concerning this project.

Level	Institution/ Group	Views and Concerns of Stakeholders	Response to Concerns
	Mzumbe University (MU) (Administrative and Academic staff, Students and Service provider)	○ The project contractor and MU should have the HSE policy in place. ○ The potential project should integrate the entertainment and recreational facilities. ○ Through compliance with economic justice, local food vendors (mama and baba lishe) should have access of doing business within the MU-Main campus. ○ The potential project should have breast-feeding area for staff and student mothers. ○ Focus on proper liquid and solid waste management. ○ Public health and safety should be incorporated in the project life cycle. ○ Focus on intensified MU, Main campus security, a security system should be in place prohibiting unauthorized people to access into the campus. ○ The proposed project should have alternative sources of energy (e.g., generators and solar energy). ○ The proposed academic buildings should have special discussion rooms. Also, library chairs should be fixed as an attempt of managing noise pollution. ○ The proposed lecture rooms should have proper audio-visual aids to enhance the learning process.	○ Proponent and contractor shall have a health and safety policy and implement it to reduce injury/accident at work ○ The proponent will ensure that during the design period for proposed establishment the contractor should consider the area for breast-feeding for both staff and students who having a babies. ○ The proponent and contractor shall ensure proper management of solid waste and policies for waste management will be adhered to which will guide all workers to protect the environment. ○ The proponent shall construct composting facility for management of solid waste. ○ The proponent and contractor will ensure health and safety of workers through the project life cycle. ○ During the construction phase, the proponent shall ensure that the area under the project is fenced and only workers and permitted visitors will have access to enter the proposed project premises. ○ Security personnel from recognized security company shall be employed to provide service for 24 hours during construction phase. ○ Lighting bulbs shall be installed and used to produce sufficient light during night hours within the project area. ○ The proponent shall install alternative energy like solar pannel and backup generator. ○ The proponent shall consider construction of special discussion rooms during design period and installation of audio-visual aids to enhance the learning process.

Level	Institution/ Group	Views and Concerns of Stakeholders	Response to Concerns
Others	**Non-Government Organisations (NGO's) and Service providers**	○ Priority in students' enrollment should be given to female and disabled people.	○ The proponent will shall priority to disabled persons and female in students' enrollment at MU.

5.7. Stakeholders Engagement Plan (SEP)

Effective stakeholder engagement improves the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation. The proposed project has engaged stakeholders as per SEP developed for HEET project. The engagement plan will be reviewed and updated throughout the project implementation. During this process, the focus and scope of the SEP may change to reflect the varying stages of project implementation and to encompass any changes in project design and lessons learnt from previous phases of the Project.

Table 5.4: Stakeholders Engagement Plan

Stakeholder Name	Stakeholder Type	Engagement Objective	Engagement Method	Frequency/Timing	Expected Outcome
MU (Administrative & Academic staff)	Internal	Ensure project aligns with university goals and objectives.	Meetings Regular progress update	Throughout project duration	○ Clear communication channels, support for project objectives
MU Students	Internal	Provide a safe and conductive learning environment	Information sessions & surveys	Mobilization phase	○ Awareness of potential disruption
Local community (Mzumbe ward and corresponding villages i.e. Changarawe, Vikenge and Tangeni)	External	Minimize construction related inconvenience	Community meeting	Mobilization and Construction phase	○ Mitigation measure for dust, noise and traffic. ○ Responsiveness to concerns
Construction Contractor	External	Efficient and timely project delivery	Regular progress meeting. Site visits	Throughout construction phase	○ Clear project requirement. ○ Adherence to construction schedule
Government Authorities (TCU, TANESCO, OSHA, FIRE, RUWASA, MORUWASA,	External	Comply with regulations and obtain necessary permits.	Project registration. Permit application process. Regular updates	Mobilization phase	○ Timely approval of permits, adherence to regulations

Mvomero District Council)					
Environmental Agencies (Division of Environment, and NEMC)	External	Minimize Environmental and Social Impact	Environmental and Social Impact Assessment, consultation sessions	Mobilization phase	o Mitigation measure for Environmental concerns. o Compliance with regulation
Donors/Funding Agencies (World Bank)	External	Accountability and transparency in fund utilization	Reporting mechanisms. Project presentations	Throughout project duration	o Clear financial reporting, alignment with World Bank requirement.

Source: Consultation with stakeholders (April 2023)

5.8 Grievance Redress Mechanism

A Grievance Redress Mechanism (GRM) is a formal system established to address and resolve complaints or grievances raised by stakeholders or affected groups. This is designed to provide an avenue for stakeholders or affected groups to engage with the project on issues of concern or unaddressed impacts. In order to make this aim a reality, MU will develop a grievance handling mechanisms and procedures to address grievances associated with the construction of university facility and rehabilitation of existing water supply system including grievances related to PAP and contractor's grievances.

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 Stakeholder engagement operates as a bi-directional procedure. Thus, it is crucial to establish a feedback mechanism system that allows stakeholders who are impacted by or have an interest in the proposed project to express their input (like opinions, requests, suggestions, and grievances) for review and, if necessary, seek resolution. It is important to acknowledge that not all grievances may be considered valid or applicable to the proposed project context. Nonetheless, the feedback mechanism should operate in a non-judgmental manner and document all received feedback.

The implementation of a Grievance Mechanism Procedure guarantees that complaints are properly documented and treated well with fairness and appropriateness. MU strives for ongoing enhancements to this procedure. The Grievance Mechanism was communicated to the relevant parties during the public consultation sessions. The Grievance Handling Officer (GHO) appointed by MU has the responsibility for handling all types of grievances arising from implementation of all projects and sub-projects under the HEET project including work related grievances and managing the Grievance Register. Complaints can be submitted in written or verbal form either .directly by the complaint or through MU employees, Contractor, Consultant and Mvomero District Council.

5.8.1 Purpose

A Grievance Redress Mechanism (GRM) is necessary for addressing the legitimate concerns of the project affected persons. Grievance handling mechanisms provide a formal avenue for affected groups or stakeholders to engage with the project on issues of concern or unaddressed impacts.

The aim of a Grievance Mechanism document is to effectively handle complaints and grievances raised by communities and local stakeholders in equitable, fair, timely and transparent manner. Also, it fosters mutual confidence and trust by providing a platform to address stakeholder concerns, gather information about their issues, and serve as an early warning system to tackle problems before they potentially becoming more challenging and costly to resolve. It is crucial to address these grievances in a timely manner to ensure the smooth execution of the project.

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.

5.8.2 Scope

The grievance mechanism will be utilized to address complaints and grievances from stakeholders whether they perceived or actual, that are connected to the actions of MU and its contractors in regards to the planned construction of the Academic building and other infrastructure in MU, Mzumbe ward, Mvomero District Council. A complaint or grievance refers to any matter, concern or problem (Whether they perceived or actual) that an individual stakeholder or community group has regarding the operations and activities of MU and its contractors.

5.8.3 Features of Grievance Redress Mechanism

The features of a grievance redress mechanism should include;

a. **Accessibility;** the mechanism should be easily accessible to affected group or stakeholders, ensuring that they can submit their grievances conveniently.
b. **Clear Procedures;** there should be well defined procedures for submitting, reviewing, and resolving grievances. This includes the steps involved, required documentation and timelines for resolution.
c. Impartiality and Fairness; the mechanism should be impartial and treat all grievances with fairness, without bias or favoritism towards any party involved.
d. **Confidentiality;** Confidentiality should be maintained to protect the privacy and identity of individuals involved, especially when dealing with sensitive matters. For example, in case of complaints related to Gender Based Violence (GBV), grievances will be treated with due confidentiality. Specific provisions will be included for complaints related to Sexual Exploitation and Abuse (SEA) that could be derived from the project to ensure the survivor's confidentiality and rights.
e. **Timely Response;** the mechanism should aim to provide timely responses to grievances, ensuring that individuals are kept informed about the progress of their complaints.
f. **Resolution and Remedies**; the mechanism should have provisions for resolving grievances effectively and providing appropriate remedies to the aggrieved parties. This includes corrective actions, compensation, policy changes or other forms of resolution.
g. **Feedback and Monitoring;** Regular feedback and monitoring of the grievance redress mechanism are essential to identify areas for improvement and ensure its effectiveness over time.

5.8.4 Grievance Mechanism Process or Procedures

The responsibility of managing the grievance mechanism at MU will rest with Project Coordinator, who will allocate resources to the Grievance Handling Officer for handling correspondence, facilitating internal resolutions, maintaining a record of grievances, and providing reports both

internally and externally. The Grievance Handling Officer will collaborate, assist, and cooperate with other work groups to develop appropriate solutions and responses. It is crucial to follow the approval process for external communication and reporting to ensure consistency with MU policies and approved key messages. The following are procedures that should be followed throughout the entire process to ensure complete resolutions of a grievance;

5.8.4.1 Receive and Register/Logging Grievance

Every grievance will be registered using the Grievance Receipt and Resolution Form for HEET Project Affected Person (PAPs). PAPs shall file the grievance through a special e-mail established for receiving grievances, suggestion boxes, meetings or directly to the GHO who will record grievances/complaints receipt and resolution form and MoEST GHO. The GHO is responsible for reading and explaining the recorded information to the complaint to ensure accurate representation of the complaint or grievance. If a grievance is reported to someone other than the GHO, all forms must be promptly transferred to the GHO within 24 hours of receipt or as soon as practically possible.

In situations where the grievance is of an urgent nature and demands immediate action, it is important to guide the complaint to the GHO and promptly inform the Project Coordinator. Such urgent matters may include environmental concerns, safety issues, or complaints regarding human rights violations related to security. Each grievance will be assigned a unique case number, and all communication and consultations related to the grievance will be documented and securely stored. Regular monitoring of the database will enable the identification of recurring grievances, facilitating the development of suitable measures for addressing them effectively.

5.8.4.2 Acknowledging Receipt of a Grievance

The GHO will promptly acknowledge receipt of any complaint or grievance, ensuring that is done within a maximum of 5 day from the submission date. The complaint will be informed of the expected timeframe for receiving a response. The Grievance Acknowledge the resolution form should certain a unique reference number and contact information, such as a phone number or alternative method for reaching the MU. Additionally, the project commits to providing a response within a specified period which is about 2 weeks after the grievance is logged. The acknowledgement will include a summary of the grievance, details of how the MU intends to address it, and an estimated timeframe for delivering the final response.

Also, the response will either accept or refute responsibility for the grievance and next step will be the investigation and resolution or immediate actions to be taken.

5.8.4.2.1 Screen

Upon receiving a grievance, it will undergo a screening process ranging from level 1 to 3, as defined in table below, to ascertain the suitable course of action. The GHO will be in charge of assigning a grievance owner who will be responsible for engaging with the external stakeholder

and finding a resolution. The screening of grievances will depend on their level of severity, determining the appropriate grievance owner and approach for addressing the grievance.

Therefore, The University has no Grievance redress mechanism that is connected with the building projects. The grievance redress mechanisms at MU will involve three levels which are described below;

Table 5.4: Grievance Screening

Level	Issue Description	Management Approach
Level 1	A grievance that is limited in scope, occurring as a single occurrence and primarily affecting a specific location and involving one person filing the complaint. Please not those certain isolated grievances, despite being singular in nature, may be deemed substantial enough to be classified as level 1 grievances, such as instances where a violation of national or international law has taken place.	Grievance Handling Officer will notify the management of MU and subsequently employ authorized solutions to address and manage the response.
Level 2	A grievance that arises repeatedly within the local community or region, and is deemed to have the potential to disrupt MU operations or generate unfavourable attention from local information or other stakeholders.	Develop a plan for addressing grievances and create a response to be reviewed and approved by MU and other relevant management.
Level 3	A grievance that is extensive and recurring, causing long-lasting harm and/or receiving unfavourable attention from local media, or is perceived to have the possibility of generating negative media on MU operations and comments from local stakeholders.	Give priority to issues management, legislative and regulatory advocacy process, and establish a suitable management strategy.

5.8.4.3 Assess and Investigating a Grievance

The Grievance Handling Officer will conduct a thorough investigation of all submitted grievances, engaging other departments, contractor and MU management as necessary to fully comprehend the circumstances that give rise to the grievance. The GHOs aims at completing investigation within two (2) weeks of the grievance first being logged and will involve the aggrieved person or people in this investigation to ensure their views are incorporated. Also, the GHO is responsible for keeping the complainant informed about the progress the progress of the review. If additional time is required to examine the grievance, the complainant will be notified in writing, along with an indication of when a resolution will be provided.

5.8.4.4 Grievance Resolution

Based on the findings from the investigation, the GHO attempts to resolve the grievance through dialogue, negotiation or other appropriate means. The objective is to find a satisfactory solution that addresses the concerns raised. However, if complainant is satisfied, the GHO should seek their

sign off and determine if any follow up is needed to monitor resolution implementation. Once the measures have been implemented the grievance should be closed. Also, if the grievance still stands then the GHO will initiate further investigation and determine the steps for future action. And If the PAP is not satisfied with decision of GHOs, the grievance is referred to the Grievance Redress Integrity Committee (GRIC) respond within 2 weeks' time from the submission.

5.8.4.5 Third party appeal

If the complainant is dissatisfied with the solution proposed by the Grievance Redress Integrity Committee (GRIC) and requires broader consultation, grievances will be referred to an impartial third party for review and final decision. The Chairman of the GRIC, in consultation with the project coordinator, will forward the issue to the next level (third party). This third party should be neutral, respected, and agreed upon by both MU and the affected parties. Potential third-party reviewers may include public defenders, District Commissioners, Regional Commissioners, Legal Advisors, local or international NGOs, or technical experts.

The third party will assess the case and determine if further reasonable actions can be taken. If all reasonable and justifiable corrective actions have been exhausted, a written notice will be provided to the complainant, formally closing their grievance. The notice may include supporting documents such as paid invoices, written agreements, photographs, emails, etc., as evidence of the resolution actions taken and adherence to the Grievance Mechanism Procedure. In cases where the complainant's address is unavailable, they may be notified by telephone or in person.

5.8.4.6 Follow up and Close Out

Once resolutions have been approved and agreed upon by the complainant, it is the responsibility of the GHOs to promptly initiate the administrative process to redress the grievance. The details of the resolution, including the action plan, and the target timeframe for closure must be updated in the Complaint/Grievance Register. The case is considered "resolved" only when the agreed resolution has been implemented, and it then transitions to a "closed" status.

To acknowledge the receipt of the resolution, the GHOs must request the complainant to sign the form in three designated places. The complainant's signature signifies their acknowledgment of the receipt, satisfaction with the outcome (or notification of alternative escalation mechanisms if unsatisfied, with a maximum activation timeframe of 30 days), and confirmation that they have been respectfully informed about the outcome of the reviews without objections.

In situations where complainants are hesitant to sign any forms or when no forms are used, the GHOs verbally seeks feedback on the satisfaction with the process and outcome. For example, they may ask if there are any suggestions for process improvement or if the complainant is content with how the process was handled. With the consent of all parties present, this interaction can be recorded on a voice recorder.

5.8.5 Monitoring and Reporting

It is important to consistently monitor and evaluate the performance of the grievance mechanism throughout the duration of the project. This monitoring aims to enhance both the system itself and the overall project. All reported grievances should be promptly recorded in the designated system, along with the corresponding target resolution dates. The management of MU will routinely monitor grievances as part of their broader project management responsibilities, maintaining comprehensive records of raised complaints throughout the project's lifecycle. Upon receiving grievances, electronic notifications must be distributed to the management team. Grievance records should be accessible to management at all times. The GHOs will compile monthly internal reports, which will be shared with the management team. These reports will include the following information:

- The number of grievances logged in the previous period, categorized by level and type.
- The number of stakeholders who have expressed dissatisfaction with the resolution after 30 days.
- The number of grievances that remain unresolved after 60 days, categorized by level and type.
- The number of grievances resolved directly between the GHOs and the complainant, without the involvement of legal or third-party mediators, categorized by level and type.
- The number of grievances concerning the same or similar issues.
- The Grievance Officer's responses to the concerns raised by various stakeholders.
- The actions taken to incorporate these responses into the project's design and implementation.

These reports, along with other relevant records, will be available for external review if necessary. A suitable grievance report should be included in MU annual reporting, which will be accessible to the public. A hard copy of the report will be kept at the MU offices, and an electronic version will be made available online.

5.8.6 Storing of Grievance

MU will securely file all records, such as grievance forms, investigation notes, interview records, and meeting minutes, to uphold the privacy and confidentiality of all parties involved.

CHAPTER 6: IMPACTS ASSESSMENT, MITIGATION MEASURES AND PROJECT ALTERNATIVE

6.1 Introduction

Assessment of environmental, social and economic impacts in this report are conducted to help determine the acceptability of the project, and to make sure that adverse impacts are properly addressed and mitigated accordingly. The assessment process during mobilisation, construction, demobilisation, operation and decommissioning phase involves looking at:

- The environmental baseline features.
- Uniqueness of the project and project design features.
- Potential vulnerabilities and the nature.
- Location of the project, and
- Duration of activities.

Chapter seven details the suggested steps for mitigation, which MoEST, through MU, is dedicated to implementing. The objective is to avoid or minimize the adverse effects identified. This study aims to ensure that the investments funded by this project adhere to both the World Bank Environmental Standards (ESS) and the Government of Tanzania (GoT) legislations in an environmentally and socially responsible way.

- The assessment of environmental risks and impacts encompassed several aspects: (i) adhering to the Environmental Health and Safety Guidelines (EHSGs) outlined by the WB; (ii) evaluating risks concerning community safety; (iii) addressing issues linked to climate change; (iv) considering any potential threats to the preservation, conservation, maintenance, and restoration of natural habitats and biodiversity; and (v) examining the impacts on ecosystem services and the utilisation of living natural resources.
- The assessment of social risks and impacts involved: (i) identifying potential threats to human security, such as crime or violence; (ii) analyzing risks that could disproportionately affect specific individuals or groups due to their unique circumstances, making them more disadvantaged or vulnerable; and (iii) evaluating negative economic and social consequences related to the involuntary acquisition of land or restrictions on land use.

The following aspects were considered when determining the significance of identified impacts:

Figure 6.1: Impacts Identification (Source: 3Es Consultant, 2023)

6.1.1 Nature of Impact

There are two basic natures of impacts; impacts that tends to be beneficial or useful to the environment or social-economic aspects are termed as Positive Impacts and those which tends to affect the environment or social-economic aspects in a negative way are termed as Negative Impacts.

6.1.2 Duration of Impact

The duration of impacts defines the timeframe by which the impact will be felt or the time by which the positive or negative impacts related to the project will continue to occur. In other writings, they are termed as temporal scale. This duration can either be short term, medium term, long Term or permanent.

6.2 Environmental Impact Rating Scale

In order to guarantee a fair and accurate comparison among different studies conducted by ESIA teams, a uniform assessment approach was employed to evaluate the significance of the identified impacts. The assessment of impact significance, which refers to the importance of the impact within the larger context of the affected system, was based on specific criteria.

- **Severity/Benefit**: the importance of the impact from a purely technical perspective;
- **Spatial scale:** extent or magnitude of the impact (the area that will be affected by the impact);
- **Temporal scale:** how long the impact will last:
- **Degree of certainty**: the degree of confidence in the prediction;
- **Likelihood:** an indication of the risk or chance of an impact taking place;

The impact assessment involves analyzing of the overall effect within the surrounding environment to determine the significant of the impact. This assessment considers various factors such as social, cultural, historical, economic, political and ecological aspects. As a result, the severity or benefit of an impact is initially assessed within a specific field of expertise before evaluating its significance on a larger scale. This requires two separate rating scales, one to determine the severity or benefit and another to determine the environmental significance.

6.2.1 Severity/Benefit

The severity of impacts is determined by experts who use their professional judgement to assess the degree of change that negative impact would have on the existing conditions, or the level of benefits that positive impacts would bring to a specific affected system or specific affected group (Table 6.1).

Table 6.1: Severity rating scale

Negative Impacts	Positive Impacts
Very severe An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated. For example, change in topography.	**Very Beneficial** A permanent and very substantial benefit to the affected system(s) or party (ies), with no alternative to achieve this benefit. For example, the creation of a large number of long-term jobs.
Severe Long-term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.	**Beneficial** A long-term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these. For example, an increase in the local economy.
Moderately severe Medium- to long-term impact on the affected system(s) or party(ies), that could be mitigated. For example, constructing a narrow road with an area with low conservation value.	**Moderately beneficial** A medium- to long-term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising are equally difficult, expensive and time consuming (or a combination of these), as achieving them in this way.
Slight Medium- to short term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	**Slightly beneficial** A short- to medium-term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.
No effect The system(s) or party(ies) is not affected by the proposed development.	**Don't know/Can't know** In certain cases, it may not be possible to determine the severity of the impact.

The extent of the impacts can be assessed both with and without measures to minimize them in order to illustrate the gravity of the impact if no action is taken. The term mitigation encompasses more than just compensation and encompasses concepts of control and remedy. When it comes to positive effects, optimisation refers to any approach that can enhance those benefit. Both mitigation and optimisation should be realistic, technically feasible and economically viable.

6.2.2 Spatial scale

The Spatial scale defines the extent or area over which the impact will take place. Environmental Impacts due to the proposed underground transmission cables can affect the environment or social-economic aspects at Household level, Localized, at a study area, District, Regional, National or International Level. See Table 6.2.

Table 6.2: Spatial scale

Individual	Individuals in the area that could be affected
Households	Households in the area could be affected
Localized	A few hectares in extent (from the site). The specific area to which this scale refers is defined for the impact to which it refers.
Study Area	Includes the entire project area.
District	Includes areas around the project includes Mzumbe ward within Mvomero District Council.
Regional	The impacts will be of such a nature that it may affect the Morogoro Region.
National	The impacts will be of such a nature that it may affect the entire Tanzania.
International	The impact would affect resources and processes outside the borders of Tanzania.

6.2.3 Temporal scale

The temporal scale defines the times over which the impacts would continue to occur (Table 6.3).

Table 6.3: Temporal scale

Temporal scale	Explanation
Short term	Less than 5 years.
Medium term	Between 5 and 20 years
Long term	Between 20 and 40 years, and from a human perspective essentially permanent
Permanent	More than 40 years, and resulting in a permanent and lasting change.

6.2.4 Criteria and Significance Rating

The significance of the impact, considering all the assessment criteria mentioned earlier, serve as an indication of its overall importance (Table 6.4). The assessment of significance was conducted within the appropriate context, recognizing that an impact can be relevant to either the ecological environment, the social-economic environment. This can be achieved by ensuring that all ESIA team followed the mentioned objective criteria, subjectivity was minimized to the greatest extent possible. Nevertheless, it is important to acknowledge that there will always be an element of judgement involved that cannot be entirely eliminated from the assessment of significance.

The importance of an impact does not always correlate directly with its severity, even though one would anticipate a direct relationship, meaning that a severe impact would typically be considered highly significant. However, this is not always true. For instance, alterations to the geology could be significant in terms of their severity, but their significance is perceived as low because society does not consider the environmental changes to be important.

Table 6.4; Significance of an Impacts

Significance	Explanation
High (+3)	These impacts will usually result in long-term effects on the natural and/or cultural environment that will only be mitigated over very long periods of time. At times, this is not possible and it is up to the government to decide if this is acceptable when considering the benefits of the Project.
Moderate (+2)	These impacts will usually result in medium to long term effects on the natural and/or cultural environment. These impacts do exist but not substantial, and usually result in moderately severe effects or moderately beneficial effects. The emphasis for moderate impact is on signifying that the impact has been reduced to a level that is as low and reasonably practicable
Minor (+1)	These impacts will usually result in medium to short term effects on the natural and/or cultural environment. The environmental and/or social conditions will be affected, but the impact is small enough that it is unlikely to be a concern to the government, communities and organisations.
Negligible (0)	There are no primary or secondary effects at all that are significant to scientists or the public. Also, this means that the existing environmental and social conditions will not be affected or the effect is not detectable. A negligible impact is likely to be of no concern to the government, communities and organisations.

The impacts were further rated on a scale of "–3" to "+3" through "0" in the following manner:

- +3: High positive impacts
- +2: Moderate positive impacts
- +1: Minor positive impact
- 0: Negligible/ No impacts
- -1: Minor negative impact
- -2: Moderate negative impacts
- -3: High negative impacts

The team focused on significant positive and negative impacts that were rated -2, -3 and proposed mitigation measures (Table 6.5).

Table 6.5 : Summary of Potential Environmental and Socio-economic Impacts

S/N	Identified Impacts	Description of Impacts	Mobilization phase	Construction Phase	Demobilization Phase	Operation Phase	Decommissioning Phase
Socio-Economic Impacts							
1	Job Creation and employment opportunities	The impact is direct, indirectly,inducive, cumulative and reversible	**+2**	**+2**	**0**	**+3**	**0**
2	Increased Business/trade opportunities	The impact is direct, indirectly,inducive, cumulative and reversible	**+2**	**+2**	**0**	**+3**	**0**
3	Increased Government Revenues	The impact is direct, indirectly,inducive, cumulative and reversible	**+2**	**+2**	**0**	**+3**	**0**
4	Disruption of Economic and Social Activities	The impact is direct, indirectly,inducive, cumulative and reversible	**-2**	**-2**	**0**	**-2**	**0**
5	Increased level of crimes	The impact is direct, indirectly,inducive, cumulative and reversible	**-2**	**-2**	**0**	**-2**	**-1**
6	Prevalence of Communicable diseases	The impact is direct, indirectly,inducive, cumulative and partially reversible	**-1**	**-2**	**0**	**+2**	**0**
7	Increased Traffic and road accidents	The impact is direct, reversible, cumulative and inducive	**-1**	**-2**	**0**	**-2**	**-1**
8	Income to local suppliers and service providers	The impact is direct, indirectly, and inducive	**+1**	**+2**	**0**	**+3**	**0**
9	Increased skills and impart knowledge to local communities	The impact is direct, indirectly, and inducive	**0**	**+2**	**0**	**+3**	**0**
10	Occupational Safety and Health impacts	The impact is direct, indirectly, and inducive	**0**	**-3**	**-1**	**-2**	**-2**
11	Community Health, Safety and Security impacts	The impact is direct, indirectly, and inducive	**0**	**-3**	**-1**	**-2**	**0**
12	Conflicts and grievances	The impact is direct, indirectly, and inducive	**0**	**-2**	**0**	**-2**	**0**

S/N	Identified Impacts	Description of Impacts	Mobilization phase	Construction Phase	Demobilization Phase	Operation Phase	Decommissioning Phase
13	Impact on gender during employment	The impact is direct, indirectly, partially reversible, cumulative and inducive	-1	-3	0	-2	0
14	Population/Labour influx	The impact is direct, indirectly, and inducive	0	-3	0	-1	0
15	Insecurity and theft	The impact is direct, indirectly, and inducive	0	-2	0	-1	0
16	Food Insecurity and inflation of prices on other social services	The impact is indirectly and inducive	0	-2	0	-1	0
17	Child labor	The impact is direct, indirectly, and inducive	0	-1	0	0	0
18	Increase of Admission of Students to MU	The impact is direct, indirectly, and inducive	0	0	0	+3	0
19	Growth of Trade and Increased Investment	The impact is direct, indirectly, and inducive	0	-1	0	+3	0
20	Production of skilled labor force for implementing various development policies, plans and goals for sustainable social and economic growth of the Nation	The impact is direct, indirectly, and inducive	0	-1	0	+3	0
21	The growth of Banking activities in the project area	The impact is direct, indirectly, and inducive	0	-1	0	+2	0
22	Increased incidences of diseases and ill health	The impact is direct, indirectly, and inducive	0	-2	0	-2	0
23	Increased pressure on social services and utilities	The impact is direct, indirectly, and inducive	0	-3	0	-2	0
24	Health and safety risks due to fire hazards	The impact is direct, indirectly,inducive, and reversible	-2	-2	0	-2	-1

S/N	Identified Impacts	Description of Impacts	Mobilization phase	Construction Phase	Demobilization Phase	Operation Phase	Decommissioning Phase
25	Increased water demand	The impact is indirect, reversible and inducive	0	-1	0	-2	0
26	Increased energy demand	The impact is direct, reversible and inducive	0	-1	0	-2	0
27	Loss of employment and business opportunities	The impact is direct, indirectly,inducive, and reversible	0	0	0	0	-3
28	Loss of revenue to institutions and the government	The impact is direct, indirectly,inducive, and reversible	0	0	-3	0	-3
Environmental Impacts							
29	Loss of vegetation and other natural resources (Energy and water)	The impact is direct, indirectly, inducive and irreversible	-2	-1	0	0	0
30	Impairment of air quality due to dust and gases emission	The impact is direct, indirectly,inducive, and reversible	0	-2	-2	0	-2
31	Contamination and /impaired quality of receiving body (land and water)	The impact is direct, indirectly,inducive, and reversible	0	-2	0	0	-1
32	Contribution to Climate Changes	The impact is direct, indirectly,inducive, and reversible	0	-1	0	0	-1
33	Increased Noise level	The impact is direct, indirectly,inducive, and reversible	0	-2	0	0	-1
34	Increased vibration	The impact is direct, indirectly,inducive, and reversible	0	-2	0	0	-1
35	Generation of solid and hazardous wastes	The impact is direct, indirectly,inducive, and reversible	0	-3	0	-3	-1
36	Generation of liquid waste	The impact is direct, indirectly,inducive, and reversible	0	-3	0	-1	-1
37	Erosion of Exposed Surfaces	The impact is direct, indirectly,inducive, and reversible	-1	-2	0	0	-1
38	Loss of visual Aesthetics	The impact is direct, indirectly,inducive, and reversible	0	-2	0	0	-2

S/N	Identified Impacts	Description of Impacts	Mobilization phase	Construction Phase	Demobilization Phase	Operation Phase	Decommissioning Phase
39	Increased water pollution	The impact is direct, indirectly,inducive, and reversible	0	0	0	-2	0
40	Increased Storm Water Generation and Overflow	The impact is direct, indirectly,inducive, and reversible	0	0	-1	-1	0
41	Impact from poor hygienic condition	The impact is direct, indirectly,inducive, and reversible	0	-1	-1	-2	0
42	Loss of aesthetic value due to haphazard disposal of demolished waste	The impact is direct, indirectly,inducive, and reversible	0	0	0	0	-2

KEY

+1	Minor positive impact	**-1**	Minor negative impact
+2	Moderate positive impacts	**-2**	Moderate negative impacts
+3	High positive impacts	**-3**	High negative impacts
0	Negligible		

6.3 Possible Potential Impacts during Mobilisation Phase

A. POSITIVE SOCIAL IMPACT

6.3.1 Job Creation and employment opportunities

During this phase people will be employed by the contractor to do mobilisation works such as quarrying, material extraction and transportation activities etc. This will increase the income to all those who have the opportunity to be employed by the contractor. Also, the increased demand for goods and services may induce self-employment opportunities and spur local economic activity.

The project intends to recruit a qualified contractor who will employ about 130 unskilled and semiskilled laborers from the project region and about 20 skilled laborers from outside the project area. This illustrates an indirect impact when unskilled and semiskilled labor are obtained locally, whereas skilled labor may come from a regional or even international pool. The project offers temporary employment possibilities that run the course of the mobilisation phase.

Moreover, as the project workforce's need for a variety of goods and services rises, the possibility of self-employment options is highlighted. Local food sellers, operators, security guards, engineers, OHS officers, accountants, procurers, and casual laborers may become more in demand as a result. These impacts are moderate, localized, temporary,induced, with direct and indirect consequences, and reversible because they depend on the number of workers needed for the project during the mobilisation stage.

Enhancement measures

- The contractor will be urged to hire as much local labor that is unemployed but willing to work hard as possible, up to a maximum of 50% unskilled labor. This will guarantee that the initiative benefits the local population better.
- The contractor should provide employment based on the idea that everyone should have equal access to opportunities.
- Communities close to the project site will be urged to develop high-quality goods and services.
- Opportunities for employment will be made available in accordance with qualifications, accepted interviewing procedures, and grading systems.
- Conduct fair and transparent recruitment processes to ensure equal opportunities for all interested individuals, promoting inclusivity and diversity Local communities shall be encouraged to produce quality goods and services for the project.
- Implement training programs to enhance the skills of the local workforce, ensuring they acquire the necessary qualifications for available job opportunities.
- Ensure strict adherence to labor standards and regulations, providing a safe and supportive working environment for all employees
- Both professional and unskilled laborers hired for the project should receive fair remuneration.

6.3.2 Increased Business/trade opportunities

Local entrepreneurs, including food vendors, accommodation providers, and shop owners, are poised to gain from the influx of workers, including those from the contracting company and laborers from nearby villages like Changarawe, Vikenge, and Tangeni. This surge in demand for goods and services directly affects businesses in the vicinity of the project area, resulting in a short-term, localized economic boost. The heightened demand for food, accommodation, and other goods is expected to fuel economic growth for small businesses, particularly in the aforementioned villages, contributing to the local economy during the initial stages of project implementation. However, this impact is reversible, likely waning as the project concludes its mobilization phase.

Enhancement measures

- Encourage the project to prioritize the procurement of goods and services from local businesses. This can include construction materials, equipment, and various services required during the mobilization phase.
- Implement training programs to equip local residents with skills relevant to emerging market opportunities. This can include workshops on entrepreneurship, vocational training, and business management.
- Promote environmentally and socially sustainable business practices to ensure that the increased market opportunities contribute to long-term economic and community well-being
- Implement fair and transparent procurement processes to ensure that local suppliers have equal opportunities to participate. This can include clear guidelines, open bidding processes, and fair evaluation criteria
- Ensure monitoring of labour standards among contractors, sub-contractors, workers and service providers; and
- Qualified local vendors/ entrepreneurs should be given priorities to supply different goods and services to the project.

6.3.3 Increased Government Revenues

During the mobilisation phase, the project is expected to generate income and employment opportunities, creating a conducive environment for local businesses to flourish. Services such as food, hotel accommodations, and building materials are likely to experience heightened demand, leading to a surge in financial transactions within the local business community. Consequently, this economic activity will contribute to additional tax revenue for local government authorities, enhancing their capacity to provide social services in the region. This impact is considered indirect, localized, and moderate in nature. While the impact is significant, it is considered moderate as it is constrained to the local level. The effects are expected to be realized in the short to medium term and are reversible if the project is altered or discontinued. Additionally, this impact contributes to the cumulative economic growth and development of the region and the nation at large.

Enhancement measures

- Local authorities can strategically plan and implement tax structures that ensure optimal revenue collection during the peak construction activities. This may involve revising tax rates on construction-related transactions and services
- Promote local economic development projects that align with the construction activities to sustain economic transactions beyond the construction phase.
- Encourage local businesses to provide goods and services required for the construction, fostering a symbiotic relationship.
- Awareness creation for the people in the area on the importance of paying revenues.

B. NEGATIVE SOCIAL IMPACT

6.3.4 Disruption of Social-Economic Activities and Services

During the mobilization phase, the transformation of the designated area in Changarawe, Vikenge, and Tangeni villages, traditionally used for local economic activities like cultivation, has a localized effect. The movement of trucks along Mzumbe-Morogoro Road and other access routes within the area will disrupt the normal routines of various community members, including food vendors, public and private transport users, MU students, and students from nearby schools. This disruption is short-term, confined to the mobilization phase, and reversible after construction. While significant locally, its broader impact is moderate and contributes to the cumulative effects on the local socio-economic landscape.

Mitigation measures

- Exploring alternative routes or diversions with proper simulation before implementation.
- Provision of temporary traffic lights and flagmen will also reduce the impact.
- MU will provide and distribute other land to community of Changarawe, Vikenge and Tangeni Villages to conduct agricultural activities like maize cultivation etc.
- Contractor shall Develop and implement a comprehensive traffic management plan to minimize disruptions along the road. This plan should include designated routes for construction vehicles and scheduling deliveries during non-peak hours
- Contractor shall conduct awareness programs for the local community, including food vendors, passengers, drivers, and students, to inform them about the upcoming disruptions. Provide information on alternative routes and timing to minimize inconvenience
- Environmental and Social Specialists of MU should explore the possibility of temporarily relocating key services, such as food vendors or public transportation, to less affected areas during the mobilization phase. This can help maintain essential services without significant interruption
- Establish effective communication channels between the construction team and the local community to address concerns and provide real-time updates on construction activities. This fosters transparency and community engagement.

6.3.5 Increased level of crimes

The recruitment of a diverse workforce from surrounding communities of Changarawe, Vikenge and Tangieni villages coupled with potential investments in goods and services, is expected to lead to a moderate population increase and the growth of trading centers near the project area. This influx of individuals with varied backgrounds and behaviors may contribute to changes in norms and behaviors, resulting in an elevated risk of increased crime levels among those residing in the Changarawe, Vikenge and Tangeni village and surrounding trading centers. The impact is likely to be short-term, reversible, and significant within the immediate vicinity of the project, with the potential for cumulative effects over time if not adequately addressed during subsequent project phases

Mitigation measures

- Employ people from the surrounding areas to reduce number of migrant workers.
- Establish community-based security in collaboration with mtaa/ward leaders.
- The contractor shall establish his own security to protect his properties and should establish community policing to support insufficient police force.
- The community should be encouraged to participate in security matters by providing information on suspects. This can only be done by making community to own the project as well.
- The cooperation of local people together will help to lessen criminal incidents and maintain security of people and their properties.
- Participatory community security measures (ulinzi shirikishi) should be encouraged in the surrounding communities of Changarawe, Vikenge and Tangeni village.
- Deploy trained security personnel to monitor the construction site, deterring potential thieves and enhancing overall security.
- Install surveillance cameras strategically across the construction site to monitor activities and provide evidence in case of theft or security incidents
- Implement strict access control measures, limiting entry points and ensuring that only authorized personnel have access to the construction site.
- Install adequate lighting around the construction site to minimize areas of darkness, reducing the likelihood of unauthorized access and theft.
- Foster a positive relationship with the local communities by involving them in the construction process, creating a sense of ownership and reducing the likelihood of theft.
- Establish secure storage facilities for construction materials and equipment, ensuring they are locked and well-protected when not in use.
- Conduct regular security audits to identify vulnerabilities and make necessary improvements to the security infrastructure.

6.3.6 Prevalence of Communicable diseases

A notable exception is the anticipated rise in infectious diseases, especially HIV/AIDS. This can be seen as an indirect outcome of community clustering, which is attracting job seekers from various sectors. This phenomenon has led to an influx of people into the villages of Changarawe,

Vikenge, and Tangeni, increasing the risk of communicable diseases in these communities. The growth of both existing and new shopping centers in the area may further worsen the situation. Economic activities often lead to increased employment opportunities, but they can also contribute to an increase in prostitution, which is a significant risk factor for the spread of infectious diseases, particularly HIV/AIDS.

The severity of these impacts will be moderate, primarily affecting local communities, but their significance will resonate in the lives of Changarawe, Vikenge, and Tangeni villages. It's important to emphasize that these effects are not easily reversed, and their implications are more local than regional or national.Additionally, the potential benefits of developing classrooms and related facilities, such as educational opportunities and economic development, also pose social challenges that require careful consideration. Furthermore, the accumulation of these impacts is observable and could potentially increase over time.

Mitigation measures

- Contractor should prepare and implement HIV/AIDS Management Plan
- Provide awareness to public on pathways communicable diseases.
- Provide Voluntary Counselling and Testing (VCT) centers for HIV/AIDS at MU and the surrounding communities.
- Work close to government and private institutions that deal with the spread of communicable diseases
- Provide more healthcare services and medical equipment for treatment.
- Work close to government and private institutions that deal with the spread of communicable diseases.
- Provide easy access to free or affordable condoms on the construction site and within the local communities to encourage safe sexual practices and reduce the risk of STDs, including HIV/AIDS.
- Establish regular health screening programs for construction workers to detect and address any potential communicable diseases early. This can include HIV testing, counseling, and access to medical care.
- Foster community involvement in promoting health awareness and responsible behavior. Engage community leaders to support initiatives that discourage risky behaviors and emphasize the importance of health in the long term.
- Implement campaigns to reduce the stigma associated with HIV/AIDS and other communicable diseases. This can help create a supportive environment for affected individuals to seek testing and treatment without fear of discrimination.
- Increase security measures to discourage the influx of sex workers to the construction area. This may involve collaboration with local law enforcement to maintain a safe and secure environment.

6.3.7 Safety and Health risks

Safety and health risks associated with materials and materials used during the mobilization phase of the proposed facilities at the MU-Main campus have direct and indirect negative social impacts on local Staff and members of the public exposed to accidents, noise,vibration and traffic can have immediate and specific adverse effects . Hazards including falling trees and injurious work tools are direct and local, affecting the immediate construction site and its surroundings The impact is severe, as lives can be lost at work or workers injured while working can have lasting effects. However, with appropriate safety measures, these side effects are largely reversible. The timing of these hazards is temporary, they occur primarily during the construction phase, and if not properly addressed, there is the possibility of ongoing safety concerns.

Mitigation measures

- Implement comprehensive training programs for workers to raise awareness about potential hazards and safe work practices
- Enforce strict compliance with health and safety regulations to ensure the well-being of workers and the general public.
- Regularly monitor and audit the site to confirm adherence to safety protocols
- Mandate the use of appropriate PPE, such as helmets, gloves, and safety boots, to minimize the impact of potential accidents
- Develop and communicate clear traffic management plans to minimize disruptions and risks associated with changes in traffic patterns during mobilization.
- Implement temporary traffic control measures to ensure the safety of both workers and local residents.
- Install noise and dust control measures to mitigate the immediate risks posed to the safety and health of local residents.
- Regularly monitor environmental conditions to identify and address any emerging hazards promptly.
- Establish and communicate emergency response plans to address accidents or unforeseen incidents promptly.
- Ensure that workers are adequately trained on emergency procedures to enhance preparedness.

6.3.8 Increased Traffic and road accidents

The movement of vehicles and trucks on the Mzumbe-Morogoro road to transport building materials and equipment is expected to cause a surge in traffic, affecting various user groups including villagers from Changarawe, Vikenge, and Tangeni, MU staff, MU students, and students from Mzumbe secondary and primary schools. This heightened vehicular activity raises concerns about road safety due to increased congestion and potentially reckless driving, posing a risk of road accidents. The impact is direct and localized, mainly affecting the immediate area surrounding the construction site and the Mzumbe-Morogoro road. It is expected to be short-term, reversible once construction activities cease, but could accumulate if similar projects occur in the region over time.

Mitigation measures

- The contractor should ensure the proper selection of appropriate transportation route with consultations with stakeholders, avoiding large agglomerations as well as good Site Practices such as signage and signal personnel where appropriate and vehicle lighting (front and back).
- Contractor shall develop a comprehensive traffic management plan to regulate the flow of vehicles and minimize congestion during the mobilization phase.
- Contractor should coordinate and schedule deliveries of building materials and equipment during off-peak hours to reduce the impact on regular traffic.
- Implement reduced speed limits in construction zones and install clear signage to alert drivers about the presence of construction-related activities
- Conduct public awareness campaigns to inform local residents, businesses, and commuters about the upcoming construction activities and potential traffic disruptions.
- Work closely with local traffic authorities to monitor and manage traffic flow effectively, ensuring the safety of both construction personnel and the general public
- Encourage and facilitate alternative transportation methods for construction workers to reduce the number of individual vehicles on the road.
- Establish emergency response protocols to promptly address and manage any road accidents that may occur.

B. NEGATIVE ENVIRONMENTAL IMPACT

6.3.9 Loss of vegetation due to exploitation of borrow pits, quarries, and other natural resources

The extraction of water and construction materials from borrow pits and quarries, whether authorized or not, poses a direct threat to environmental, especially in Changarawe, Vikenge, and Tangeni villages, as well as impacting MU staff, students, and nearby schools. This exploitation leads to habitat destruction, and disruption of plant species, endangering the ecosystem and livelihoods of local communities. The impact is immediate and long-term, with irreversible environmental degradation without restoration efforts. Socially, the project affects stakeholders differently, causing resource decline for local communities, reduced agricultural productivity, and disturbances like noise and traffic. MU staff and students also witness changes, affecting campus life and educational opportunities. The lack of restoration efforts compounds environmental degradation over time

Mitigation measures

- Develop a comprehensive reforestation plan to replace cleared vegetation.
- Implement habitat restoration initiatives, focusing on the replanting of native species to encourage evironmental recovery.
- Close supervision of earthworks shall be observed in order to confine land clearance within the project site.

- The contractor shall be instructed to give the uprooted trees to the residents through ward/village governments or any other arrangement may seem convenient provided he does not contravene the Forest Acts 2002.
- Appropriate landscaping programs must be planned and put into action in order to aid in the re-vegetation of a portion of the project area following construction shall be designed and implemented.
- Encourage the retention of vegetative cover by avoiding complete bulldozing to ground level.
- Implement low-impact construction methods that minimize disturbance to existing vegetation.
- Implement efficient resource management practices to minimize the extraction of building materials.
- Ensure that building materials are sourced from legitimate and sustainable suppliers to prevent unauthorized exploitation of natural resources
- Monitor and control water and energy use to minimize additional demands on these resources.
- Explore alternative sources for building supplies to reduce the impact on indeginous trees.
- Implement reforestation and restoration programs post-construction to rehabilitate affected areas and enhance environment.
- Raise awareness among local communities about the importance of preserving natural resources and involve them in conservation efforts.
- Ensure strict adherence to environmental regulations and guidelines to prevent overexploitation and degradation of natural resources.

6.4 Possible Potential Impacts during Construction Phase

A. POSITIVE SOCIAL IMPACTS

6.4.1 Job Creation and employment opportunities

During the construction phase, non-skilled laborers from Changarawe, Vikenge, and Tangeni villages and nearby areas are favored for hiring by contractors, offering them financial benefits while boosting the local economy and social welfare. Various workers, including casual laborers, masons, carpenters, joiners, electricians, and plumbers, are expected to work temporarily on the site for about 18 months. Although the impact on job opportunities is considered medium due to the significant number of available jobs compared to the local population, it's expected to result in increased wages and expenditure, ultimately improving living standards. Overall, the impact assessment leans towards being small and positive, with high probability and minimal magnitude.

Enhancement measures

- Ensure that the contractor prioritizes the hiring of local residents, both skilled and non-skilled, from Changarawe, Vikenge, and Tangeni village.
- Collaborate with local employment agencies to identify qualified candidates within the community.

- Implement training programs to enhance the skills of the local workforce, enabling them to qualify for skilled positions and fostering long-term employability
- Establish contractual agreements/code of conduct with the contractor to adhere to the employment targets, ensuring the stipulated number of skilled and non-skilled laborers are hired from the local community
- Facilitate the growth of self-employment opportunities by encouraging the establishment of businesses such as restaurants and food vendors to meet the increased demand generated by the project
- Encourage the contractor to contribute to community economic development initiatives, such as supporting local businesses and entrepreneurs, thereby fostering long-term economic resilience
- Implement a monitoring and reporting system to track the employment impact throughout the construction phase, ensuring compliance with the outlined measures.

6.4.2 Income to Local Suppliers and Service Providers

The proposed project at MU-Main Campus is anticipated to generate a positive social impact, primarily benefiting local suppliers and service providers in Mzumbe ward, including Changarawe, Vikenge, and Tangeni villages. This boost will extend to businesses involved in supplying building materials, food, and waste collection services. While the project promises direct, local, and long-term benefits, there are potential negative repercussions. Excessive demand for materials may lead to disruptions like increased traffic and noise, posing challenges for nearby neighborhoods. Additionally, inadequate waste management could result in environmental issues. These adverse effects are indirect, localized, and short to medium-term, but can be mitigated with proper planning and management.

Enhancement measures

- Purchasing materials from as many local suppliers.
- Prioritize hiring local workers for various construction-related tasks, contributing to increased employment opportunities in Mzumbe ward.
- Provide training and support to local suppliers and service providers to enhance their capacity to meet the increased demand
- Actively involve and engage local suppliers for construction materials needed during the establishment phase.
- Provide training and support to local suppliers and service providers to enhance their capacity to meet the increased demand
- Implement fair and transparent procurement processes to ensure that local suppliers have equal opportunities to participate in supplying materials and services for the project
- Integrate environmentally sustainable practices in construction to minimize negative impacts on the local environment, ensuring long-term benefits for the community.

- Maintain open and transparent communication with local suppliers and service providers to address any concerns and ensure that they are well-informed about project developments.

6.4.3 Increased skills and impart knowledge to local communities

Unskilled and semi-skilled labors are more likely to benefit from skills particular from skilled workers. The unskilled are likely to be upgraded to semi-skilled while the semi skilled will be exposed to better techniques and work methodologies etc. Skills to be acquired may include use of construction equipment, operation of heavy materials, health and safety procedures at construction sites, mixing concrete materials and tar, laying drainage, laying pavements, excavating trenches etc, helping to provide them with the skills needed to make a significant, positive impact on their lives cumulative positive impact .This impact is direct , local and short-term.

Enhancement measures

- Develop and implement structured training programs for both skilled and non-skilled laborers in the local communities.
- Contractor shall provide on job skills and training.
- Actively engage the local workforce in construction activities, providing hands-on experience with new equipment and technologies
- Implement capacity building initiatives to equip individuals with essential skills required for their roles in the construction process
- Establish a system for continuous monitoring and evaluation of the training programs to ensure their effectiveness
- Involve local communities in the planning and execution of skill development initiatives to ensure relevance and sustainability.
- Implement a monitoring and evaluation system to track the effectiveness of the skills transfer programs.
- Regularly assess the impact on individuals and the community to make necessary adjustments for continuous improvement.

B. NEGATIVE SOCIAL IMPACTS

6.4.4 Occupational Safety and Health Impacts

Occupational safety and health implications will be significant during the construction period of the proposed facilities at MU-Main campus. The daily hazards of construction workers, including accidents caused by faulty machinery and hazardous materials, pose a direct risk to the workers involved and to the community of Changarawe, Vikenge and Tangeni village. The potential for serious injury or death is high , so the impact is greater in the short run. Air pollution during construction affects workers on site on a permanent basis.

Although the impacts are reversible with adequate safety measures and inspections, the risks are greater due to extensive construction activities These impacts are mainly social, affecting the

health and well-being of people directly involved in construction. Therefore, this impact is local, direct, moderate to high , induced and cumulative.

Mitigation measures

- Institute good site practices include preventing public access to the construction site by securing equipment and demarcating excavation, using warning signs with appropriate text (local language) and graphic displays.
- Contractor should have registered and qualified health and safety personnel in the project during construction phase.
- Implement traffic management and safety initiatives, such as heavy truck operator and driver training and testing, speed limit enforcement, maximum load limitations, and adherence to all Tanzanian transportation laws and standards.
- Awareness campaigns /Education on HIV and STDs shall be provided to workers;
- Appropriate working gear (such as nose, ear and mouth mask and clothing) and good construction site management shall be provided.
- The contractor is responsible for barricading the building site, maintaining it hygienically, and providing enough facilities, such as trash cans, fire extinguishers, and a clean, safe water supply.
- A well-stocked First Aid kit (administered by medical personnel/First Aider) shall be maintained at the construction site. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing health education to the workforce.
- The establishment of reporting systems for the public to voice concerns or grievances over perceived hazards to their health and safety caused by the construction operation.
- There will be proper signs on site to warn workers of safety requirements as regards machines with moving parts and other equipment at site.
- Develop and implement an emergency plan including spill response.
- Safe scaffoldings and railings will be provided at heights.
- Creating a thorough health and safety plan and educating all contractor employees on it.

6.4.5 Community Health, Safety and Security Impacts

Technological advancements and investment in labor-saving equipment will require both skilled and non-skilled workers for construction projects. Skilled workers may be imported and housed in labor camps, while local low-skilled jobs, such as property protection, may be available. However, this influx of workers may negatively impact local communities from Changarawe, Vikenge and Tangeni Villages through increased social issues like crime and disease spread, including COVID-19 and HIV/AIDS. Training and adherence to a labor code of conduct are necessary to mitigate these risks. Additionally, the construction phase may pose safety risks, including increased traffic accidents due to the use of local roads by construction vehicles. The sources of harmful effects to the general public are identified in Table 6.5. This impact is moderate, localized and will be long term.

Table 6.6: Source of the harmful effects on health and community safety

Type of harmful effect	Sources of the threat
Accident risk	o During excavation work o Movements and operations of heavy equipment o Access to danger zones o Transport, handling and storage of the materials o Concrete batching and mixing plant
Indirect health risk	o Environmental pollution o Contamination of water or/and food

Mitigation measures

- Contractor should have registered and qualified health and safety personnel in the project during construction phase.
- on-site during demolition and construction.
- Establish a health and safety monitoring system to ensure that workers comply with health protocols and minimize the risk of communicable diseases, including regular health check-ups and screenings.
- Implement a comprehensive training program for all construction workers, emphasizing the importance of adhering to safety protocols, respecting local communities, and following a code of conduct to minimize negative impacts.
- Implement disease prevention programs, including awareness campaigns and access to healthcare facilities, to address potential increases in diseases such as COVID-19 and HIV/AIDS.
- Collaborate with local law enforcement to enhance security around construction sites, addressing concerns related to crime, prostitution, and alcohol abuse. Implement security measures within labor camps to ensure the safety of workers and the community.
- Develop a comprehensive traffic management plan to mitigate the risks associated with increased traffic volume during the construction phase. This includes speed limits, road signage, and coordination with local authorities to enforce safety measures.
- Conduct regular health impact assessments to monitor and address any emerging health issues within the project area, ensuring a prompt response to potential risks.
- Properly manage labor camps to ensure adequate living conditions, sanitation facilities, and medical services for imported skilled workers, reducing the likelihood of negative impacts on local communities.
- Work closely with local authorities to monitor and regulate prices of goods and services to prevent unjustified increases, ensuring that the local community is not adversely affected by inflation.
- Foster collaboration with local authorities, community leaders, and relevant stakeholders to jointly address emerging challenges, promote transparency, and ensure that the project's social impacts are effectively managed.Creating drainage channels to direct storm water movement.

- Creating stone pitching where soils have been excavated.

6.4.6 Conflicts and grievances

These conflicts might stem from construction workers interacting with married women, students, and school children. Additionally, issues such as dust and flying stones could further exacerbate tensions between construction workers and the local community. The lack of proper channels to address grievances from various stakeholders could lead to project delays, consequently escalating project costs. This impact is deemed to be local, negative, short-term, and of moderate significance.

Mitigation measures

- Conduct workshops and awareness programs for construction workers on cultural norms and local sensitivities, emphasizing respectful behavior towards married women and school children.
- Implement a structured grievance resolution mechanism that allows local community members to express concerns related to construction activities. This mechanism should ensure prompt and fair resolution of issues
- Implement effective dust control measures, such as water spraying and covering construction materials, to minimize the impact on the local environment and address concerns about dust and flying stones
- Organize regular meetings between construction project representatives and the local community to discuss ongoing activities, address concerns, and foster open communication
- Appoint a dedicated community liaison officer who serves as a point of contact between the construction team and the local community, facilitating communication and addressing grievances promptly.
- Ensure timely and transparent communication about the construction schedule, potential disruptions, and any necessary adjustments to minimize surprises and conflicts
- Implement regular monitoring of construction activities to ensure adherence to guidelines and regulations, with penalties for non-compliance, thereby promoting responsible conduct among construction workers.

6.4.7 Impact on gender during employment

Women and girls available locally from Changarawe, Vikenge and Tangani village are the main target who are more likely to bear then direct cost of gender inequalities during employment opportunities. They are likely to be lowly favored in employment opportunities. There is also a, likelihood of sexual harassments especially from male supervisors and decision makers. Acts of sexual assault harassment may include unwelcome sexual touching, sexually suggestive or degrading remarks and sexually explicit or abusive language, rape or defilement among others. This kind of behavior may cause psychological torture to the victims that may lead to permanent damage to their self-esteem. In addition, it may lead to early pregnancies for young girls, increased school dropouts and sexually transmitted diseases. This impact is considered to be local, negative, short-term, and of high significance.

Mitigation measures

- Conduct awareness programs for all project stakeholders, including workers, community members, and decision-makers, emphasizing the importance of gender equality and discouraging discriminatory practices.
- This project will ensure that there is involvement of women in project activities.
- Provide specific training sessions for project staff on recognizing and addressing gender biases. This includes promoting fair treatment and equal opportunities for both men and women.
- Implement transparent and inclusive hiring practices that ensure equal opportunities for men and women in employment and project-related activities.

6.4.8 Influx of people

Construction activities will require skilled, semi-skilled and unskilled labor that are preferable from local communities. However, the expectation may not be the same and that people may tend to migrate from different area outside Mzumbe ward to seek for employment opportunities that may pose high competition of employment opportunities to local people. This impact is considered to be local, negative, short-term, and of high significance.

Mitigation measures

- Enhance efforts to prioritize hiring from local communities (Mzumbe ward) to minimize external migration for employment.
- Implement skills training programs for the local population to enhance their employability and competitiveness for construction-related jobs
- Organize job fairs and information sessions to ensure transparent communication about employment opportunities, reducing misinformation and speculation
- Establish regular communication channels with the local communities to address concerns, provide updates, and gather feedback on employment-related issues
- Collaborate with local authorities to develop and enforce policies that regulate the influx of people during construction, ensuring a balanced impact on the local population.
- Implement monitoring mechanisms to ensure fair hiring practices and adherence to the preference for local employment, with penalties for non-compliance.
- Implement job rotation programs and skill development initiatives to ensure a diverse range of individuals can participate in the construction activities, reducing intense competition for specific roles.

6.4.9 Insecurity and theft

It is expected that there will be an insecurity and theft situation that is anticipated from the influx of new people and even locals that comes with all sorts of vices including stealing project materials and equipment. Theft in a long run may compromise the quality of work or delay the project or increase in project cost. This impact will be felt at the project site and even at the village. This impact is considered to be local, negative, short-term, and of moderate significance.

Mitigation measures

- Deploy trained security personnel to monitor the construction site, deterring potential thieves and enhancing overall security.
- Install surveillance cameras strategically across the construction site to monitor activities and provide evidence in case of theft or security incidents
- Implement strict access control measures, limiting entry points and ensuring that only authorized personnel have access to the construction site.
- Install adequate lighting around the construction site to minimize areas of darkness, reducing the likelihood of unauthorized access and theft.
- Foster a positive relationship with the local communities by involving them in the construction process, creating a sense of ownership and reducing the likelihood of theft.
- Establish secure storage facilities for construction materials and equipment, ensuring they are locked and well-protected when not in use.
- Conduct regular security audits to identify vulnerabilities and make necessary improvements to the security infrastructure.

6.4.10 Food Insecurity and inflation of prices on other social services

The anticipated influx of workers is expected to exert pressure on existing food sources in the surrounding areas. Community members from Changarawe, Vikenge and Tangeni Villages and village councils predict that the project's development may attract a significant number of people seeking income-generating opportunities, leading to increased demand for food and services. This surge in demand could result in potential chaos and inflation of prices, particularly in the food services sector. This impact can be classified as an indirect, localized, and short-to-medium-term consequence of the project. It is reversible if effective measures are implemented to manage the influx and ensure sustainable access to food resources. The impact is cumulative, as the effects are likely to intensify with the continuous development and settlement around the university.

Mitigation measures

- Encourage traders to supply food and other products to the project area.
- Sensitisation of the surrounding communities in order to make them aware of the employment and hence income generating opportunities with the proposed establishment.
- Provide more avenues for service providers e.g., cafeteria and restaurants.

6.4.11 Child labor

There is a risk that some project-related activities could involve child labor - employment of children in project activities depriving children of their childhood and that is mentally, physically, socially or morally dangerous and harmful. The Labour Management Plan may need to be provided that no one under the age of 18 may be employed or engaged in connection with the project. This impact is minor, localized and will be short term.

Mitigation measures

- MU will conduct regular monitoring of project workers in relation to health, working conditions, hours of work, minimum age, and the other requirements of national law.

- Develop and enforce a comprehensive Labor Management Plan that strictly adheres to local and international labor laws and standards, particularly those related to the employment of minors.
- Establish educational support programs to encourage children to stay in school and pursue their education. This can include scholarships, tutoring services, and awareness campaigns promoting the value of education.
- Control school dropout by collaborating with the local government and schools in the Mzumbe Ward.
- Cooperate with relevant authorities like Ministry of Labor to control child labor
- Create awareness raising to the communities on the importance of education to the children.
- The local authorities should develop bylaws to control the engagement of children in petty business or work in project related activities.

C. NEGATIVE ENVIRONMENTAL IMPACTS

The ESS3 'Resource Efficiency and Pollution Prevention and Management' recognizes that development projects often generate pollution to air, water, and land, and consume finite resources that may threaten people, ecosystem services and the environment. Impacts caused by pollution are described hereunder:

6.4.12 Impairment of air quality due to dust and ambient pollutant gases emission

Construction activities will significantly impact air quality to the project area and nearby communities such as Changarawe, Vikenge and Tangeni Villages through heightened levels of dust, stemming from various sources such as construction machinery, excavations, earthworks, rock drilling, and road works. Measuring emissions of fine particulate matter from diesel trucks, idle combustion engines, and road dust is challenging, but the resulting impacts are expected to be sporadic. Traffic fluctuations during construction will influence dust generation, necessitating estimation for minimum and maximum traffic volumes. Additionally, emissions from transport vehicles delivering building materials, such as CO2, NOx, and fine particulates from diesel-powered engines, will exacerbate air quality degradation. Gaseous pollutants like NOx and SO2 from construction machinery, vehicles, and diesel generators will further deteriorate air quality, potentially leading to global warming and health issues. Tree cutting and vegetation clearance during construction may also release particulate matter and reduce carbon sinks, exacerbating climate change effects. However, due to the project's small scale and limited construction area, the use of diesel-powered machines is expected to be minimal. This impact is moderate, localized and will be short term.

Mitigation measures

- Implement effective dust suppression techniques, such as using water sprays or dust suppressants on construction sites to minimize the release of fugitive dust.
- Prioritize the preservation of existing vegetation during construction to reduce the need for extensive clearance, minimizing the disturbance that contributes to dust emission.

- Cover sand and aggregate stockpiles to prevent wind erosion and reduce the dispersion of particulate matter into the air.
- Opt for construction practices that minimize soil disturbance and dust generation, such as limiting heavy machinery movement.
- Provide workers with appropriate PPE, including masks and respiratory protection, to safeguard their health against potential exposure to airborne particulate matter.
- Conduct awareness programs for the local community to educate them about the temporary nature of the air quality impact, its potential health risks, and the implemented mitigation measures.
- Establish a monitoring system to regularly assess air quality during construction, ensuring that concentrations of PM2.5 and PM10 remain within acceptable limits.
- Develop a responsive action plan to promptly address any exceedance of emission limits or unexpected air quality issues, ensuring a proactive approach to mitigation.

6.4.13 Contamination and /impaired quality of receiving body (land and water)

The main concerns stem from construction activities, notably quarrying, which generate various forms of waste such as cleared vegetation, topsoil, and domestic waste. This results in land degradation, soil contamination, and potential water pollution. Local communities, including Changarawe, Vikenge, and Tangeni villages, as well as Mzumbe University and nearby schools, may suffer direct and indirect consequences like water source disruptions and agricultural loss. The impact spans short to medium-term, with potential long-term effects on the ecosystem. Reversibility depends on effective mitigation measures, though some alterations may be irreversible, especially considering the cumulative impact of multiple development projects in the region.

Mitigation measures

- Efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at project areas;
- Introduction of waste disposal bins, warning notices, posted at strategic points;
- No, on site burial or open burning of solid waste shall be permitted;
- Wastes not suitable for incinerations and general municipal waste dumping (e.g., Batteries, plastics, rubbers, tyres, etc.) shall be removed for recycling, treatment, and/or disposal by licensed contractor as appropriate; and
- Instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste during bidding process.
- Wastewater from toilets should be well managed through the proper managed septic tank and soak pit treatment.

6.4.14 Contribution to Climate Changes

Construction activities will lead to emissions emanated from fuel powered equipment i.e., vehicles engines and construction equipment etc. Exhaust contains pollutants notably carbon dioxide (CO2)

plus small quantities of noxious gases such as nitrogen oxides (NOx), sulphur dioxides (SOx), hydrocarbons and particulate matters (PM). These Green House Gases (GHGs) are known to interfere with temperature system and cause climate change effects. The impact is considered to be local, negative, short-term duration and of minor significance.

Mitigation measures

- Implement the use of renewable and cleaner energy sources for construction equipment to minimize the emission of greenhouse gases. This could involve using electric or hybrid machinery powered by sustainable energy.
- Install and enforce the use of emission control technologies on fuel-powered equipment to reduce the release of carbon dioxide and noxious gases into the atmosphere during construction activities.
- Optimize construction practices to minimize the overall carbon footprint, such as efficient waste management, recycling of materials, and reducing energy-intensive processes where possible
- Raise awareness among local residents in Changarawe, Vikenge and Tangeni village about the potential impacts of construction on climate change. Engage with the community to foster understanding and support for sustainable construction practices.
- Adhere to green building standards and certifications that promote environmentally friendly construction practices. This includes designing and constructing buildings that are energy-efficient and have minimal environmental impact.
- Implement a robust monitoring system to track and report greenhouse gas emissions during construction. This will help in identifying areas for improvement and ensuring compliance with emission reduction measures.
- Ensure strict adherence to local environmental regulations and standards governing construction activities. Regular inspections and enforcement measures can help prevent excessive emissions and promote responsible construction practices.
- Plan for post-construction rehabilitation efforts to offset any environmental impact caused during the construction phase. This could involve planting trees, restoring natural habitats, or other measures to enhance the local environment.

6.4.15 Increased Noise level

Measurements done in different locations around the proposed project sites and the nearby community area indicated that the daytime noise levels ranged between 34 dB (A) and 76 dB (A) are within WHO limits and Tanzania Standard limits (TZS) guidelines. However, during construction works, the noises will increase come mainly from the units of building site (power picks, mechanical shovels, cranes, concrete batching and mixing plant etc), trucks and semitrailers charged to transport materials as well as use of explosives (career of massive rock). The extent of the nuisance will depend on the spatial organisation of the site and mainly the location of borrow pits, as well as the crushing plant, concrete plants and other noisy machines compared inhabited areas. Due to an increase in activities and number of operational vehicles, the impacts of noise will

cause disturbance to normal university operations. This impact shall not be significant to projects to be implemented at MU, Main campus as to a great extent are far away from existing campus facilities. The impact of the project on noise level generation short-term, local and moderate significance.

Mitigation measures

- Implement construction activities during specific time windows to minimize disruption during sensitive hours, such as early mornings or late evenings when community activities are at a minimum.
- Install temporary acoustic barriers or soundproofing measures around noisy machinery and construction sites to contain and reduce the propagation of noise.
- Ensure that all construction equipment undergoes regular maintenance to reduce noise emissions. Well-maintained machinery tends to operate more quietly.
- Providing ear protection materials for the workers in noisy area.
- Proactively communicate construction schedules and potential noise impacts to the local community. Seek feedback and address concerns to foster understanding and cooperation
- Provide training to construction workers on the importance of minimizing noise pollution and adopting practices that contribute to a quieter working environment.

6.4.16 Increased vibration

Construction activity can result in varying degrees of ground vibration, depending on equipment and Method Employed. Vibration will be produced by construction vehicles, plant and machinery during delivery of materials, processing of materials, and actual construction work. The Construction activities that typically generate the most severe vibrations are blasting and impact pile driving for foundation. Due to an increase in activities and number of operational vehicles, the impacts vibration will cause disturbance to neighbours and physical damage to properties near the construction site. This impact is moderate, localized and will be short term.

Mitigation measures

- Explore and implement advanced construction techniques that minimize vibrations. This may include the use of specialized equipment designed to reduce ground vibrations during activities like blasting and impact pile driving.
- Establish effective communication channels with the local community to provide timely information about construction schedules and activities that may cause vibrations. This helps residents to take necessary precautions and prepares them for potential disruptions.
- Install vibration monitoring devices in key locations to continuously monitor ground vibrations during construction. This real-time data can be used to assess the impact and adjust construction methods accordingly to stay within acceptable limits
- Modify construction methods to minimize vibration generation. For example, consider alternative pile driving techniques or adjust blasting procedures to reduce the intensity of vibrations.

- Foster an open dialogue with the local community to address concerns and gather feedback. This engagement can help in refining mitigation measures based on community input and building a collaborative approach to managing the impact.

6.4.17 Generations of Solid Wastes

The proposed establishment currently lacks waste, but the construction phase may generate hazardous and non-hazardous waste materials. Materials like sand, concrete, and steel bars, packaging materials such as cement bags and plastic containers, hazardous substances like paints and adhesives, and food waste are expected. Some materials contain hazardous substances, while non-biodegradable items like metal cuttings can have long-term environmental effects. Improper disposal could lead to pollution and health risks, contaminating land and water resources. Additionally, it may attract flies and increase bird populations due to food waste. Proper waste management is crucial to mitigate these environmental and health impacts.This impact is considered to be local, negative, short term and high significance.

Mitigation measures

- Contractor shall provide waste handling facilities such as waste bins and skips for temporarily holding domestic waste generated at the site.
- Implement a comprehensive waste segregation system to separate recyclable materials from hazardous and non-biodegradable waste.
- Adhere to proper disposal methods for hazardous substances and materials, following established guidelines and regulations.
- Employ certified waste disposal services to ensure safe handling of hazardous waste
- A special focus on waste minimization will be made in order to cut down on the amount of solid waste generated during site preparation and construction.
- Topsoil shall be stockpiled and used for reclamation or re-vegetation at the site during landscaping.
- Develop a detailed waste management plan that outlines proper disposal methods, recycling procedures, and strategies for reducing waste generation.
- Ensure adherence to the waste management plan throughout the construction and operational phases
- Conduct training sessions for construction and operational staff on proper waste handling, segregation, and disposal practices.
- Unusable construction trash, including broken pipes, formwork, and other building supplies, will be disposed at a designated area.

6.4.18 Generations of Liquid Wastes

The types of wastewaters generated during construction activities include sewage, grey water and process water. Sewage effluent will be produced in the sanitary facilities provided and collected on site. Septic waste produced in scattered sites will also pose a problem to human health. This will be particularly severe if the waste is not collected directly and / or is released directly into the environment without any treatment. Grey sewage will pose less of a direct problem to human

health but will be produced in large quantities in the camps. Hunting and process water will be generated from batching plants, equipment maintenance centers and ordinary sites. Wastewater discharge in environment can pollute environment and causing unhygienic sanitary conditions and nuisances to the human perceptions. Types and sources of wastewater are shown in Table 6.6. This impact is high, localized and will be short-term.

Table 6.6 Types and source of wastewater

Type	Source
Sewage	Works Camp
	Offices Other elements of the main camp
	Remote secondary facilities
	Sites
Grey water	Works Camp, cooking, personal and clothes washing
	Offices/Other camps
Hunting and process water	Oil spills
	Aggregates and process plants
	Equipment maintenance centers
	Ordinary sites

Mitigation measures

- Enforce and adhere to best practices in waste management to ensure that all liquid wastes are handled and disposed of in an environmentally responsible manner, minimizing health risks and pollution
- Conduct awareness programs for the local community in Changarawe, Vikenge, and Tangeni villages educating residents about the importance of proper waste disposal and its impact on health and the environment.
- Contractor shall be instructed to put in place acceptable procedure for handling hazardous waste such as oils, lubricants and non-combustible waste.
- Wastewater will be discharged directly to the existing WSP and the proposed one that will be established under HEET project.
- Establish a monitoring system to regularly assess the effectiveness of waste management practices during construction. Enforce strict compliance measures to ensure that all generated liquid wastes are treated and disposed of according to established standards.
- Collaborate with local environmental regulatory authorities to ensure that the construction activities comply with existing regulations and standards for waste management.
- Develop and implement an emergency response plan to address any unforeseen incidents or spills during the construction phase, minimizing the potential for long-term environmental damage.
- Explore opportunities for reusing or recycling treated water where applicable, reducing the overall volume of liquid waste generated and promoting sustainable water management practices.

6.4.19 Erosion of Exposed Surfaces

Inadequate compaction and resurfacing compounded by rain, trampling, vegetation clearance etc. may cause erosion and consequent sediment load in runoffs. This is mostly likely to happen if construction is undertaken during the rain seasons. This impact is moderate, localized and will be long term.

Mitigation measures

- Implement thorough compaction and resurfacing techniques during construction to minimize exposed surfaces prone to erosion.
- Introduce erosion control measures such as the use of erosion control blankets, sediment barriers, and vegetative cover to reduce the impact of rain, trampling, and vegetation clearance.
- Construction will be done as per engineering design and procedure of which a maximum requirement of compaction strength is achieved during the construction. That is maximum dry density (MDD) specified in the design manual by consultant.
- Maintain gravel fill and/or re-vegetate around the structures.
- Plan construction activities considering weather conditions to avoid exacerbating erosion during periods of heavy rainfall.
- Most of construction activities will be done during dry weather.
- Eng Most of construction activities will be done during dry weather.age with local communities in Changarawe, Vikenge, and Tangeni villages to raise awareness about the potential impacts of construction and involve them in decision-making processes.
- Implement measures to protect local resources during construction to minimize disruptions to the communities.
- Establish a monitoring system to track erosion control measures and enforce compliance with construction guidelines to prevent excessive sedimentation in runoffs.
- Develop plans for post-construction restoration, including replanting vegetation and rehabilitating affected areas to promote ecosystem recovery.

6.4.20 Loss of Visual Aesthetics

Like any development, there is a ‘zone of visual intrusion’ from which it can be seen. These refer to the impacts of landscape change on people: on the views that people have from their homes, offices, footpaths, cars as they drive past, etc. Construction activities shall affect the landscape by removing existing landscape features in place such as trees and replacing them by concrete and gravel surface. If operated at night, the lights will lead to the increase of light pollution. The following components of the landscape can be affected by development:

- Physical factors: geology, landform, microclimate, drainage, soil, ecology; and
- Aesthetic factors: proportion, scale, enclosure, texture, colour views as well as sounds

However, the proposed project components can also change the overall character of an area to make it look more urban. This impact is moderate, localized and will be long term.

Mitigation measures

- All structures should adhere to set standards in terms of quality, shapes, height, color etc.
- Integrate landscaping initiatives and create green spaces within and around the project site. Planting trees and maintaining natural elements will help preserve the visual appeal and soften the urbanized look.
- Implement visual barriers such as construction fences, temporary screens, or artistic panels to shield construction activities from direct view. This will minimize the visual intrusion experienced by residents.
- Enforce strict construction schedules to limit noisy and visually disruptive activities to specific hours, reducing the impact on the community during peak times.
- Foster open communication with the local community to gather feedback and address concerns related to visual changes. This involvement can help tailor mitigation efforts to meet community expectations.
- If nighttime construction is necessary, use low-impact lighting to minimize light pollution. Shielding and directing lights away from residential areas will preserve the night sky's visual quality.
- Develop comprehensive plans for the post-construction period, including the restoration of altered landscapes. This may involve replanting native vegetation and restoring natural features to enhance the visual aesthetics.

6.4.21 Loss of vegetations

Much of the vegetation in the project area is characterized by bushes and shrubs. There are also natural and manmade forests nearby the project area. Overall, the clearance of the plants will have minor significant impacts on ecology of the site and the nearby surroundings.

The only negative impact anticipated from clearing of vegetation will be opening up of the area especially by felling some indigenous trees and grasses aforementioned and this will change the panoramic view of the area. Exposed area as a result of trees felling is likely to be exposed to the agents of soil erosion especially wind and water. Clearance of vegetation– especially bulldozing to ground level - has tendency to damage local vegetation cover and potentially damage/ degrade environment and increase risks to soil erosion. Permanent clearance will be confined only to project site. This impact is minor significant, local and will be of short-term.

Mitigation measures

- Implement a comprehensive plan for revegetation and reforestation in and around the construction site to restore the indigenous trees.
- Integrate green construction practices to minimize the need for extensive clearing of vegetation.
- Explore alternative construction methods that reduce the ecological footprint.
- Close supervision of earthworks shall be observed in order to confine land clearance within the project site.
- Implement erosion control measures, such as the installation of sedimentation barriers and erosion control blankets, to prevent soil erosion from wind and water.

- Establish a environmental monitoring program to track the recovery of vegetations and ensure the effectiveness of mitigation efforts.
- Conduct awareness programs to educate the local community about the importance of preserving environment and the ongoing mitigation measures.
- Regularly review and update the environmental management plan based on monitoring and feedback.

6.4.22 Impact on natural resource (Energy and water)

The project construction and operation will consume fossil fuels (mainly diesel) to run transport vehicles and construction machinery. Fossil energy is non-renewable and its excessive use may have serious environmental implications on its availability as discussed in number of impacts at this section, price and sustainability. In this regard, there will be need to use electricity sparingly since high consumption of electricity influences negative effects to natural resources and their sustainability. This impact is therefore considered to be negative, cumulative and of short-term duration and of moderate significance.

The construction and operation activities will require an estimated amount of 40000liters of water per day from Tangeni river. Water will mainly be used for concrete mixing, curing sanitary and washing purposes. Excessive water use may have negative impact on water sources and their sustainability. This impact considered negative, cumulative and of short-term duration and of minor significance.

Mitigation measures

- Implement a comprehensive plan for revegetation and reforestation in and around the construction site to restore the indigenous trees.
- Integrate green construction practices to minimize the need for extensive clearing of vegetation.
- Explore alternative construction methods that reduce the ecological footprint.
- Close supervision of earthworks shall be observed in order to confine land clearance within the project site.
- Implement erosion control measures, such as the installation of sedimentation barriers and erosion control blankets, to prevent soil erosion from wind and water.
- Establish a environmental monitoring program to track the recovery of local fauna and ensure the effectiveness of mitigation efforts.
- Conduct awareness programs to educate the local community about the importance of preserving environment and the ongoing mitigation measures.
- Regularly review and update the environmental management plan based on monitoring and feedback.

6.5 Possible Potential Impacts during Demobilisation Phase

There will be need to demolish the temporary structures that will be used for storage and pit latrines for the construction workers. The construction rubble and construction wastes will have to be cleared from the site in readiness for the operation phase of the project.

A. POSITIVE SOCIAL IMPACT

6.5.1 Reduced noise levels

The heavy machinery and the 150 construction workers will leave the site thereby reducing the amount of noise from the project site. The reduction in noise levels is reversible, benefiting the immediate surroundings and communities.

Enhancement measures

- Removing all working and damaged construction mechanical equipment.

B. NEGATIVE SOCIAL IMPACT

6.5.2 Loss of employment

All construction workers will be laid off once construction works are completed. This will mean loss of income and source of livelihood for 150 workers. This impact is reversible if alternative opportunities are created. Also, the impact is short-term, localized with high significance.

Mitigation measures

- Implement skill development programs to enhance the employability of the affected workers.
- Provide training in areas with high demand in the local job market.
- Informing workers, the project duration when employing them
- Establish job placement services to assist displaced workers in finding alternative employment opportunities.
- Educating the labour force on the need to save part of their wages.
- Paying severance benefit to all laid off workers according to the provision of the labour laws.
- Establish community support programs to provide financial assistance or counseling services to those facing immediate economic challenges.

6.5.3 Loss of business opportunities

Local traders selling construction materials will lose their source of income and livelihood. The small-scale business men and women selling foodstuffs, and fruits to construction workers will also lose their source of income. This will particularly affect local traders of construction materials and small-scale entrepreneurs selling food to construction workers. The impact is short-term, localized with high significance.

Mitigation measures

- Offer training programs to local traders and entrepreneurs to diversify their products and services. This can help them adapt to changing circumstances and explore alternative business opportunities beyond construction-related activities

- Establish clear communication channels between the construction project management and local businesses. This ensures that businesses are informed about the project timeline, allowing them to plan for potential disruptions and adjust their operations accordingly.
- Encourage collaboration among local businesses to create a network that can collectively address challenges and explore new business opportunities. This can foster resilience and community support
- Facilitate the establishment of support services for construction workers, such as designated areas for purchasing food from local entrepreneurs. This ensures that some business activities can continue despite the temporary disruptions.
- Advocate for and facilitate access to government assistance programs for affected businesses. This could include tax relief, low-interest loans, or other financial support measures.
- Work with local authorities and businesses to develop long-term plans for economic resilience, considering potential future construction projects and identifying strategies to minimize the impact on local businesses.

C. NEGATIVE ENVIRONMENTAL IMPACTS

6.5.4 Dust and noise pollution from demolishing works

In the event of future rehabilitations and upgrading, the building needs to be demolished necessitating disposal of demolition waste. The noise pollution and air quality will be most affected during the demolition work with the emission of dust particles from machinery like excavators, electric grinders and mixer. The impact receptors are likely to include site workers and residents in the neighboring areas. The substances which will most significantly contribute to air pollution will be particulate matter (PM). PM may cause health hazards when inhaled in significant amounts and can also reduce the visibility. This impact is moderate, local and will be short term.

Mitigation measures

- Employ dust control technologies such as water spraying systems to minimize the release of dust particles during demolition activities. This will help maintain better air quality
- Implement noise reduction strategies, including the use of sound barriers, noise-dampening equipment, and scheduling noisy activities during specific times to minimize disruption to nearby residents.
- Provide workers with personal protective equipment (PPE) such as masks and ear protection to mitigate health risks associated with dust inhalation and prolonged exposure to high noise levels
- Conduct awareness programs for local residents, informing them about the demolition schedule, potential impacts, and measures being taken to mitigate dust and noise pollution. This foster understanding and cooperation
- Establish a monitoring system to regularly assess air quality and noise levels. Implement a reporting mechanism to promptly address any deviations from acceptable standards, allowing for quick corrective actions

- Explore and utilize demolition methods that generate less dust and noise, such as mechanical methods that are more controlled and produce fewer airborne particles.

6.6 Possible Potential Impacts during Operations Phase

During operation phase there are number of effects, these effects will affect the environment of the vicinity as described below:

A. POSITIVE SOCIAL IMPACT

6.6.1 Increase of admission of students to MU

The proposed project will provide adequate academic facilities to academic institutions, people and the country at large hence number of students enrolled at MU will be increased. These will increase admission of students from high schools and other colleges as a result access to higher education will be enhanced for the benefit of the country. Also, the proposed project components shall provide adequate and conducive space for training, seminars, workshops etc. This impact is high, national and will be long term.

Enhancement measures

- Gender and disabled groups will be considered during the student's selection process
- MU shall increase advertisement to attract more students to study the priority programmes for the Nation.

6.6.2 Increase of revenue to MU

MU will increase students' enrolment which in return will increase revenues through university fees. This will increase academic institution's financial standing which will enhance good governance and efficient running of the Universities/colleges. Thus, the goals of academic institutions to become center for seeking knowledge and disseminating it to a wide spectrum of beneficiaries at national and regional levels are going to be fully realized. This impact is high, national and will be long term.

Enhancement measures

- Innovate business activities linked with academic activities for enhancing income of the University
- Implement robust financial management practices to ensure that the increased revenue is allocated efficiently and effectively.
- Establish financial reserves for unforeseen circumstances and to secure the long-term financial stability of MU
- Develop a comprehensive risk management plan to identify and mitigate potential risks that could impact the financial stability and success of MU
- Implement a robust monitoring and evaluation system to track the outcomes and impacts of the new buildings and other initiatives
- Develop and expand online education programs to reach a wider audience and attract students from different geographic locations.

6.6.3 Job creation

Jobs to be created during the operation phase of the project can be divided into two (2) categories: direct and indirect jobs; their volume depends strongly on the level of operational activities. Direct jobs are those related to operational services, teaching, Indirect jobs are those created by the positive impacts of the institution to economic sectors. These include cleanliness, stationeries, catering and commercial activities. In addition, indirect jobs will include agriculture, livestock, energy and water sector. The ripple effect (or catalyst) on the entire regional and national economy is also the origin of the creation of 'indirect' jobs. This impact is high, regional and will be long term.

Enhancement measures

- Implement skill development programs and training initiatives to enhance the employability of local residents. This could include vocational training in areas relevant to the institution's operations, such as hospitality, agriculture, and business management
- Prioritize the hiring of local residents for various positions within the institution. This can be facilitated through collaboration with local employment agencies or community outreach programs to connect potential employees with job opportunities
- Foster partnerships with local businesses in the cleanliness, stationery, catering, and commercial sectors to ensure a mutually beneficial relationship. This can stimulate economic growth in the community and create additional job opportunities
- Establish initiatives or support existing programs that promote entrepreneurship within the community. This could involve providing mentorship, or resources to aspiring entrepreneurs, thereby creating new businesses and job opportunities
- Engage with the local community through regular communication channels to inform them about job opportunities, skill development programs, and other initiatives. Educate the community on the long-term benefits of the institution and how they can actively participate in and benefit from its operations.

6.6.4 Increased commercial and social activities around project locations

Construction of the proposed project components is anticipated to attract more businesses due to demand of various services and goods required to sustain the University. The University will also cause growth of the existing businesses around the project location. This impact is high, local and will be long term.

Enhancement measures

- Establish platforms for ongoing dialogue between the university and local businesses to understand their needs and concerns
- Offer training programs and workshops to local residents to enhance their skills and make them more employable in the growing market.
- Collaborate with local vocational institutions to provide specialized training in areas related to the services and goods in demand

- Organize cultural and social events on the university campus that attract residents from the surrounding areas, fostering a sense of community and promoting local businesses.
- Develop and implement policies that prioritize the procurement of goods and services from local businesses, thereby supporting the local economy.

6.6.5 Government Revenue Collection and Economic Growth

Different governmental regulatory authorities such as National Environmental Management Committee (NEMC), Mvomero District Council, Tanzania Electricity Supply Company (TANESCO), FIRE and Rescue Force, and OSHA will benefit from the collection of revenues from the proposed project at MU. The collected amount of money is used to develop the national economy and improving the living standard of people. This impact is considered as Regional, positive, long term and of high significance.

Enhancement measures

- The project will allocate a portion of its generated revenue to various governmental regulatory authorities such as the NEMC, MORUWASA, TANESCO, FIRE and Rescue Force, and OSHA. This financial support will enable these authorities to carry out their functions effectively and contribute to overall regional development.
- Local authorities should identify the new sources of revenue in the area.
- Strengthening revenue collection mechanisms.
- Awareness creation for the people in the area on the importance of paying revenues.

6.6.6 Growth of trade and increased investment

It is envisaged that the construction of four buildings at MU and increased enrolments of students will attract a number of investors from within and outside surrounding communities to invest in meeting the needs of the increased population in the area. This is likely to enhance the development of the centres surrounding MU to Mzumbe ward. It is also expected that service providers such as food venders and general kiosks be established and increase during construction phase to provide services to both skilled and unskilled laborer working in MU for proposed project. This impact is high, local and will be long term.

Enhancement measures

- Sensitize the community to invest to accommodate business opportunities inclined by the increasing students' enrolment.

6.6.7 Production of skilled labor force for implementing various development policies, plans and goals for sustainable social and economic growth of the Nation

The project shall increase enrollment and production of quality professionals. Thus, the proposed MU project will contribute to FYDP III through generation of more skilled labor to support industrialisation. Thus, contributing to the Tanzania economy through generation of quality graduates that are relevant to the labor market requirements. This impact is moderate, national and will be long term.

Enhancement measures

- The project aims to boost student enrollment, indicating a proactive approach to meet the growing demand for skilled professionals in alignment with national development policies.
- MU is committed to providing high-quality education to its students, ensuring that graduates possess the necessary skills and knowledge to contribute effectively to the nation's development goals
- The project emphasizes aligning its curriculum and training programs with the priorities outlined in national development policies. This ensures that graduates are well-prepared to address the specific needs and challenges of the country.

6.6.8 The growth of Banking activities in the project area

The growth of population, investment and trading activities in the projects area will attract some Banks to open their offices at MU and the surrounding communities of Changarawe, Vikenge and Tangeni village and the neighbour village. Currently, there is only one bank in the area but it is expected that the increase in students' enrolments, employment and income of the people living in the area or working in the proposed establishment will consequently result to an increased rotation of funds in the area hence acts as attraction to Banking institutions in the area.

It is also expected that, both skilled and unskilled employees at MU will be paid their money through banking system and this play a major role for most of the Banks to be attracted to simplify the access of funds to their customers hence the opening of the bank branches seems to be inevitable. This impact is moderate, national and will be long term.

Enhancement measures

- The project anticipates a surge in banking institutions establishing offices in the area. This growth is attributed to the overall expansion of banking activities driven by factors such as population growth, increased investments, and heightened trading activities
- Factors like the rise in student enrollment at MU, the creation of employment opportunities, and increased income for residents and workers are expected to contribute to the circulation of funds in the local economy. This, in turn, makes the area more attractive for additional Banking institutions.
- The expectation is that both skilled and unskilled employees at MU will receive their payments through the Banking system. This integration of the payment system is likely to further incentivize Banks to operate in the area.

B. NEGATIVE SOCIAL IMPACTS

6.6.9 Increased incidences of diseases and ill health

The concentration of a large number of people within the proposed project area could contribute to increased levels of communicable diseases such as Sexually Transmitted Diseases (STDs), HIV/AIDS, TB, COVID-19 and other ailments due to interaction and concentration of people from various places. Workers tend to be tempted to engage in sexual relationships with women and

young girls in the project area. In addition, prostitutes may be attracted to the area due to the presence of workers who are usually perceived to possess a lot of money. This impact is moderate, localized and will be long term.

Mitigation measures

- Implement proactive health interventions during and after the project to address the specific health concerns of the local communities. This may include vaccination programs, health education, and access to healthcare services.
- A safety, health and environment induction course shall be conducted to all students and workers, putting more emphasis on HIV/AIDS, which has become a national disaster as well as other emerging pandemics such as COVID 19 and dengue fever.
- The proponent shall conduct medical examinations for their workers annually.
- The project shall include information education and communication component (IEC) in its budget. This will help to raise more awareness on HIV/AIDS, and means to suppress its incidence.
- Introduce preventive measures to reduce the likelihood of disease transmission. This could involve promoting hygiene practices, ensuring clean water and sanitation facilities, and establishing protocols for waste disposal to minimize environmental health risks.
- Engage with local communities to raise awareness about the importance of health and hygiene. Encourage community participation in health programs and empower them to take ownership of their well-being.
- Establish a robust system for monitoring and surveillance of health conditions in the affected areas. This includes early detection of potential outbreaks, tracking disease trends, and implementing timely responses.

6.6.10 Increased pressure on social services and utilities

The project area and nearby communities lack sufficient social and infrastructure services, including healthcare, places of worship, and water supply. As a result, the anticipated increase in student enrollment in the project area could further strain the already limited social infrastructure. Without appropriate measures to address this issue, the existing service delivery system may become significantly burdened. Additionally, the University expansion has the potential to put pressure on existing utilities such as electricity and water, which could further strain the current services delivery system. The rise in population due to employment opportunities and increased student enrollment will undoubtedly place additional strain on the existing social services. This impact is high, localized and with moderate significance.

Mitigation measures

- Use of water conservatively by instituting technologies (e.g., self-lock water taps) and awareness raising notices to users, etc.;
- Establishment of water reservoir tanks and introducing rainwater harvest system;
- Investing in training and capacity building programs for local service providers to enhance their ability to cope with increased demand. This could involve training healthcare

professionals, utility workers, and other service providers to efficiently manage the rising needs of the community.

- Conducting outreach programs to involve the local community in the planning and implementation process. This engagement helps in identifying specific needs and concerns of the community, ensuring that the development initiatives are culturally sensitive and well-received.
- Implementing employment generation programs that focus on local hiring. By prioritizing the employment of local residents, the impact on housing, transportation, and other services can be mitigated, reducing the strain on social services.
- Implementing measures to optimize the use of resources, such as energy-efficient technologies and water conservation practices. This can contribute to reducing the overall demand on utilities, making them more sustainable in the face of increased pressure.
- Establishing strong partnerships with local government authorities to jointly plan and implement infrastructure projects. This collaboration ensures that the development aligns with the overall growth strategy of the area and leverages available resources efficiently. Extraction of underground water resources;

6.6.11 Incidence of Gender Based Violence

The influx of individuals to the campus, coupled with potential stressors associated with academic pressure and social dynamics, could exacerbate existing tensions and power imbalances, leading to instances of GBV. This could manifest in various forms, including sexual harassment, intimate partner violence, or discrimination based on gender identity. The construction and operation of such facilities may attract a diverse population, potentially increasing the likelihood of GBV incidents. If not adequately addressed through comprehensive prevention strategies and support mechanisms, this impact could be significant, particularly in the medium to long term, affecting both the local community and the broader region. The impact is reversible with appropriate interventions and education programs but could become cumulative over time if left unaddressed, potentially leading to a normalization of GBV within the campus environment.

Mitigation measures

- Plan that ensures project awareness raising strategy (for workers and community members), a list of GBV service Providers to which GBV survivors will be referred, revisions to the GRM to ensure it can address GBV complaints, and information on GBV allegation procedures in the workplace.
- Implement comprehensive awareness programs within Changarawe, Vikenge and Tangeni village to educate residents about the importance of gender equality, consent, and the prevention of GBV.
- Promote community dialogues to address cultural norms contributing to GBV and encourage positive behavioral changes
- Establish and enforce clear institutional policies at MU-Main campus to prevent and address GBV among students and staff.

- Provide support services such as counseling and helplines within MU-Main campus to assist those affected by GBV.
- Conduct training sessions for MU students and staff on recognizing and responding to signs of GBV.
- Equip community leaders and relevant stakeholders with the skills to identify and address GBV issues effectively.

6.6.12 Disruption of traffic flow

The proposed project is expected to increase traffic and pedestrian traffic, especially near the campus entrance. This increased activity raises traffic congestion and surrounding safety concerns, which affect not only communities from MU but businesses run by villagers from Changarawe, Vikenge and Tangeni villages, and because it is their daily lives and due to the significant proportion of economic activities, the social effects are high. In terms of importance, the effect is both direct and indirect. Directly, it affects daily activities and the safety of the community, as well as indirectly affecting jobs and services that depend on the smooth flow of traffic.

Temporary disruption is expected in the business side , which can have long-term consequences if not handled properly. The impact can be reversed through strategic planning and collaboration with local authorities to implement traffic management solutions. Cooperation with local government, especially the Road Management Authority, is needed to address this issue. Installing new signage and implementing standardized traffic patterns are proposed solutions to reduce congestion and ensure the safety of students and community members. While the impact is primarily local, its effects can spread regionally, affecting the overlap of surrounding transport and economic activity.

Mitigation measures

- Develop a comprehensive traffic management plan that considers the anticipated increase in vehicular and non-motorized traffic during the operational phase. This plan should outline specific measures to mitigate congestion and enhance safety in the surrounding areas.
- Strategically place additional signboards to guide and inform road users about the changes in traffic patterns, entrances, and other relevant information. Clear signage can help prevent confusion and improve overall traffic flow.
- Implement coordinated traffic control measures to optimize the flow of vehicles and ensure smooth operation near university entrances. This may involve the deployment of traffic personnel during peak hours or special events to manage the increased traffic.
- Launch a public awareness campaign to inform the community, including students, faculty, and local residents, about the expected changes in traffic conditions. This could include distributing informational materials, organizing workshops, and using digital platforms to educate the public.

6.6.13 Health and safety risks due to fire hazards

Buildings are very prone to fire hazards because of different types of combustible materials and machines, which are used and installed, respectively. Electrical fault is by large the main culprit in fire accidents in buildings in Tanzania. The components of a fire are fuel (combustible substance), heat and oxygen. Some chemicals used in laboratories and training workshops may also cause fire eruption if not handled appropriately. Unless all three are present fire will not occur. Fire can cause the following effects:

i. Loss of lives;
ii. Serious Injuries;
iii. Loss of properties etc.

This impact is moderate, local and will be long term

Also, Five categories (Table 6.7) of Health and Safety hazard are likely to cause harm to environment and human. These are;

- Physical Hazards (involve environmental and can cause harm),
- Chemical Hazards (Caused by exposure to chemicals),
- Biological Hazards (Pose a threat to the health of living organisms primarily at the human),
- Ergonomic Hazards (related to efficiency and comfort at the workplace),
- Psychological Hazards (Affect the mental well-being/Health of the employees) The following table 6.8 describes the key hazards and risks associated with the proposed project,

Table 6.7: Health and Safety Hazards and associated risks

Category	Type of Hazard	Associated risk
Physical Hazard	Fire and electrical	Loss of properties, injuries and death
	Noise and Vibration	Loss of hearing and body discomfort
	Moving parts/Mechanical	Injuries and death
	Slippery	Injuries and death
Chemical Hazard	Liquid, vapor and solvents	o Respiratory diseases o Damage of lungs o Injuries and death
	Fumes and gases	
	Acids	
Biological Hazard	Microorganisms	o Skin irritations o Allergies o Infections
	Virus, Fungus and bacteria	
	Insects and parasites	
Ergonomic Hazard	Manual Handling	o Awkward postures o Back pain o Eye strain o Fatigue and stress
	Repetitive movements	
	Lifting	
	Sitting Positions	
Psychological Hazard	Overwork and tiredness	Health effect on human body
	Abuse and Harassments	Mental illness
	Discrimination	Mental illness

Source: 3Es 2023)

Mitigation measures

- Adequate number of portable fire extinguishers shall be placed at strategic locations.
- Regular fire and other disaster drills and awareness training shall be conducted.
- Fire detectors and sprinkler systems shall be installed in the buildings.
- The proponent shall insure buildings against fire Hazards.
- Workers will be sensitized on appropriate fire prevention measures
- Good housekeeping shall be maintained at all sites to reduce the fire risk.
- The design of the buildings shall strictly adhere to the Fire Safety Standards.

6.6.14 Increased level of crimes

The commencement of this project is expected to improve criminal activity in its area of operation. This increase is predicted to be a by-product of projected population growth including recruitment of workers and students plus incoming individuals drawn to invest in a growing range of goods and services in the Mzumbe ward, pose challenges largely in Ward sociological fabric. The significance of this effect is varied, including direct, indirect, and cumulative components. The increase in crime is a direct result of the demographic changes brought about by the project. Impacts are expected to be medium to long-term, extending beyond the immediate operational phase, and have the potential to have a lasting impact on local communities. Fortunately, the nature of the impact is considered to be reversible, allowing for mitigation measures such as enhanced protection and local programs to combat adverse social consequences, restore status which appears to have hardened in the affected area.

Mitigation measures

- Increase the presence of law enforcement and security personnel in the affected areas.
- Implement advanced surveillance systems and technologies to monitor and respond to criminal activities.
- Establish community policing programs to foster collaboration between law enforcement and local residents.
- Develop and implement community outreach programs to raise awareness about crime prevention strategies.
- Encourage community members to actively participate in crime prevention through neighborhood watch programs.
- Conduct regular awareness campaigns to educate residents about the potential risks and how to protect themselves
- Strengthen partnerships with local government agencies, community leaders, and NGOs to create a coordinated response to crime. And establish communication channels for sharing information and coordinating efforts to address security concerns.
- Introduce social programs and initiatives aimed at addressing the root causes of crime, such as unemployment, poverty, and lack of educational opportunities.
- Support community development projects that contribute to a positive and inclusive social environment.

6.6.15 Increased water demand

Increased water demand during the operation phase of the proposed establishment at MU-Main campus will have environmental and social consequences. This impact may strain local water resources and affect communities in Changarawe, Vikenge and Tangeni villages,within Mvomero District Council. This is indirect impact, medium term, local and potentially reversible depends on water resource management measures.

Mitigation measures

- Install water conserving taps that turn- off automatically when water is not in use.
- Encourage water reuse/recycling during occupation phases.
- Roof catchments of building blocks should be provided with rainwater harvesting systems (gutters, down pipes and water storage facilities) to enhance collection and storage of the resulting run-off. Such water can be used in watering flower gardens, general cleaning etc.
- Implement comprehensive water resource management strategies to ensure sustainable use.
- Monitor water sources regularly to assess the impact on local water availability.
- Promote water-efficient technologies and practices within the establishment to minimize consumption.
- Implement water conservation measures such as rainwater harvesting and reuse/recycling
- Conduct awareness programs to educate local communities about responsible water usage.

6.6.16 Increased energy demand

The proposed facilities at MU-Main campus is expected to cause a notable negative impact on the local community during their operation. This impact is characterized by a significant increase in energy consumption, particularly in the energy-intensive operations involving equipment, climate control, and lighting. As a result, there will be a surge in the overall demand for energy resources, potentially leading to a greater carbon footprint and strain on existing energy infrastructure.. This is direct impact, medium term, local and potentially reversible depends on energy resource management measures.

Mitigation measures

- Put off all lights immediately when not in use or are not needed.
- Use energy conserving electric lamps for general lighting.
- Integrate energy-efficient technologies and equipment in laboratory operations, focusing on reducing energy consumption without compromising functionality.
- Implement advanced climate control systems that optimize heating, ventilation, and air conditioning (HVAC) to ensure energy is used more efficiently, adapting to specific needs and usage patterns
- Replace traditional lighting systems with energy-efficient LED lighting and incorporate motion sensors to automatically control lighting based on occupancy, reducing unnecessary energy consumption.
- Invest in renewable energy sources, such as solar panels or wind turbines, to supplement the energy demand and decrease reliance on traditional, carbon-intensive sources.

- Engage with local energy providers to explore collaborative measures, such as demand-response programs or incentives for adopting energy-efficient practices.

C. NEGATIVE ENVIRONMENTAL IMPACTS

6.6.17 Increased water pollution

Wastewater from MU is discharged into receiving environment upon treatment in WSP. Water pollution will mainly be caused if sanitation systems used during project operation will be inadequate. This is due to the fact the proposed project will cause an increase in enrolment. Onsite sanitation systems always cause groundwater and surface water pollution. Other liquid wastes will include chemicals from laboratories and cleanliness activities. It should also be noted that oil spills on the soil have the potential to pose longterm threats to groundwater quality. Simple laboratory measurements and transport models developed in different studies can anticipate the degree of long-term groundwater contamination easily. Thus, the risk of water degradation is assessed as important, which may have an indirect impact on the surface water too. This impact is moderate, localized and will be medium term.

Mitigation measures

- Wastewater will be discharged directly to the existing WSP at the campus. Also, WSP will be established inline with this project to manage all wastewater generated at MU-Main campus due to increase of population during operation phase.
- Implement advanced treatment technologies to ensure that wastewater, especially from laboratories, undergoes proper treatment before being released into WSP.
- Implement strict compliance measures to ensure that the hazardous liquid waste meets acceptable environmental standards before disposal
- Conduct educational programs within MU-Main campus to raise awareness among staff, service provider and students about the potential environmental impact of improper wastewater disposal.
- Promote responsible laboratory practices and waste management to reduce the generation of hazardous liquid waste
- Collaborate with local communities in Mzumbe ward to create awareness about the environmental consequences of water pollution. And involve community members in monitoring activities and reporting any observed anomalies in water quality
- Develop and implement emergency response plans to address any accidental spills or releases of hazardous substances into the wastewater system.

6.6.18 Storm water generation and overflow

The area for the proposed establishment has no any existing facilities and is covered by few vegetation hence no stormwater will be generated. However, due to the esblishments of this proposed facilities a lot of storm water will be generated due to presence pavements, concrete surfaces and building roofs. The structures will tend to compromise the infiltration capacity of the land surface hence rendering water free to the environment. The storm water generated might have

impacts on structures downstream as well as being a factor for soil erosion and poor water quality. This impact is localized, longterm and with minor significane.

Mitigation measures

- The design of storm water drainage will be given a high priority for the new buildings.
- The design shall provide sufficient greenery area for facilitating soil infiltration.
- Creating rainwater management systems can help prevent runoff and promote infiltration. This may include the use of rainwater harvesting tanks, drainage systems, and water retention areas for collecting and distributing rainwater
- Installing permeable pavements to promote infiltration and reduce runoff.
- Constructing retention and detention basins to temporarily store stormwater and control the release of runoff into the drainage system
- Incorporating vegetative swales and buffer strips to slow down and filter stormwater, promoting natural infiltration and reducing soil erosion
- Utilizing green roofs on buildings to absorb and slow stormwater runoff, reducing the volume and velocity of water entering the drainage system.

6.6.19 Impact from poor hygienic condition

Poor cleanliness of supporting facilities such as toilets and washrooms may invite flies that are agent of diseases like cholera and diarrhoea. Bad odour and bad visual is the outcome of poor hygienic condition that may impact human health condition. This impact is localized, negative, short-term and of moderate significance.

Mitigation measures

- Provision of adequate toilets for students and workers.
- Sensitisation of workers on understanding of potential health and safety issues related to poor hygienic condition.
- Construction of WSP for disposal of liquid wastes.
- Regular Inspection and maintenance of the waste water system network
- Improve dust suppression mechanisms within the MU premise

6.6.20 Generation of solid and hazardous wastes

The construction and subsequent operation of the proposed facilities at the MU-Main campus is expected to generate a significant amount of waste from cardboard, boxes, cardboard, food scraps and plastic bottles, bottles and voucher items. The significance of these impacts is complex, with direct consequences affecting the immediate environment and indirect and cumulative effects that can spread over a wider area In the short term, weeds improper management may result in local environmental degradation and pollution, not only in the project area but in the surrounding ecosystem. posing challenges to local environmental sustainability Whether the impact is reversible or irreversible depends on how waste management is implemented during and after the operation phase improve effectively.

Mitigation measures

- Provision of dust bins or rubbish pits for the wastes produced.

- Ensure that the scrap metals and other hazardous wastes are well managed stored and dispersed off via licensed scrap metal dealers.
- Training on waste management shall be done to all personnel, operators and services providers.
- Prohibit open burning since will increase pollutant gases to the atmosphere.
- Implement a comprehensive waste segregation system to categorize different types of waste materials.
- Establish recycling facilities or system to process recyclable materials such as paper, cardboard, plastics, and metals.
- Implement a waste segregation system that separates waste into different categories such as recyclables (paper, plastic, glass, metal), organic waste (food scraps, yard waste), and non-recyclables. Provide clearly labeled bins for each category in easily accessible areas.
- Conduct awareness campaigns and workshops to educate students, faculty, and staff about the importance of waste management, proper segregation, and the benefits of recycling and composting.
- Establish a composting system for organic waste generated in cafeterias areas. The compost produced can be used for landscaping and gardening projects on campus.
- Implement a system for collecting and properly disposing of electronic waste (e-waste) such as old computers, printers, and other electronic devices.

6.6.21 Generation of liquid waste

The establishment of new facilities at MU-Main campus is expected to generate liquid waste from different sources such as rainwater runoff, sanitation systems, and laboratory water usage. This liquid waste is foreseen to have a negative impact, persisting over an extended period. Despite its longevity, the overall significance of this impact is projected to be relatively low. It is emphasized to implement plans for managing and reducing this impact during the development phase. This impact it is expected to be direct, short term, local and potentially reversible.

Mitigation measures

- Ensure that the wastewater is propery treated through WSP before being discharged into the open environment.
- Develop and implement comprehensive waste management plans specifically targeting liquid waste generated. This includes proper disposal methods, recycling initiatives, and the use of environmentally friendly practices.
- Optimize sanitation systems to minimize liquid waste production. This may involve the installation of water-efficient fixtures, regular maintenance to address leaks, and the use of technologies that reduce water usage in sanitation facilities.
- Implement strategies to control and manage rainwater runoff to prevent contamination. This could involve the installation of permeable surfaces, green infrastructure, and drainage systems designed to capture and treat runoff before it enters water bodies.

- Promote water-efficient practices in laboratories to reduce water consumption. This may include the use of advanced equipment that minimizes water usage, recycling systems for laboratory water, and the adoption of best practices in water conservation.
- Establish monitoring programs to regularly assess liquid waste generation and ensure compliance with environmental regulations. This involves conducting regular inspections, implementing corrective actions when necessary, and maintaining records to track the effectiveness of mitigation measures

6.7 Possible Potential Impacts during Decommissioning Phase

No decommissioning will occur near future after the construction, as these building will be used throughout the operation phase. However due to the compliance and requirement MU facilities is designed for a lifespan of several years' subject to effective maintenance. During a certain period, it is possible that infrastructure facilities will be retrofitted at the sites, so major structural changes and expansions may be necessary. At the end of the project life, a scheduled project will be necessary to remove the site component, a process referred to as decommissioning.

A. NEGATIVE SOCIAL IMPACT

6.7.1 Loss of employment and business opportunities

People employed by the project will lose their jobs. This will have significant impact on these people and their families. Other dependents of the project, such as suppliers of various services (e.g., security and cleaning companies) and goods (such as food stuff and stationaries) will lose the business opportunities. This impact is considered negative, long term and of moderate significance. This impact is high, local and will be moderate term.

Mitigation measures

- Seminars shall be conducted on alternative means of livelihood after termination of job.
- Implement comprehensive employment transition programs for affected workers, including skill development and retraining initiatives to enhance their employability in alternative sectors.
- Establish a support mechanism for local businesses affected by the decommissioning, providing training, and resources to adapt to new market conditions
- Conduct regular and transparent communication with stakeholders, including affected communities, to keep them informed about the decommissioning process, potential impacts, and mitigation measures.
- Work closely with local government authorities to identify and implement measures to offset the negative impact on the affected persons, such as creating alternative employment opportunities or initiating community development projects.

6.7.2 Loss of revenue and business opportunities

Ending the project means losing revenues to both MU and government agencies such as TANESCO, Mvomero District Council, NEMC. As discussed above both local and central government are receiving revenue/annual fees from the project. In case of the decommissioning of

the project, revenue generated will cease. This impact is negative, short-term and of minor significance.

Mitigation measures

- Explore alternative revenue streams to compensate for the loss incurred from the discontinued project.
- Identify and develop new projects or initiatives that can generate income for both institutions and the government
- Implement economic development programs in Changarawe, Vikenge and Tangeni village ward to stimulate local economic opportunities.
- Encourage entrepreneurship and job creation to offset the negative economic impact on residents.
- Engage with the affected communities to understand their needs and concerns.
- Implement social support programs or initiatives to assist individuals and businesses impacted by the loss of economic opportunities.

B. NEGATIVE ENVIRONMENTAL IMPACT

6.7.3 Loss of aesthetic value due to haphazard disposal of demolished waste

In the event of future rehabilitations and upgrading, the buildings may need to be demolished necessitating disposal of demolish wastes. Haphazard disposal may cause contamination of soil and water bodies. This impact is moderate, local and will be medium term. This impact is moderate, local and will be long term.

Mitigation measures

- Formulate a comprehensive waste management plan specifically tailored for the decommissioning phase. And, clearly outline procedures for the segregation, collection, transportation, and disposal of demolished waste.
- Implement demolition techniques that minimize the generation of waste and reduce environmental impact.
- Opt for methods that allow for the salvage and reuse of materials, thereby decreasing the amount of waste generated.
- Conduct a thorough site characterization and assessment to identify potential environmental sensitivities and vulnerabilities. This will aid in determining appropriate disposal methods and areas, preventing contamination of soil and water bodies.
- Identify and designate specific areas for waste disposal, ensuring they are environmentally suitable and comply with regulations.
- Implement measures to prevent leachate from entering soil and water bodies.
- Establish a monitoring and inspection program to assess the effectiveness of waste disposal measures.
- Regularly inspect the disposal areas to identify and address any issues promptly.

6.7.4 Dust and noise pollution from demolishing works

In the event of future rehabilitations and upgrading, the building needs to be demolished necessitating disposal of demolition waste. The noise pollution and air quality will be most affected during the demolition work with the emission of dust particles from machinery like excavators, electric grinders and mixer. The impact receptors are likely to include site workers and residents in the neighboring areas. The substances which will most significantly contribute to air pollution will be particulate matter (PM_{10} and $PM_{2.5}$). PM_{10} and $PM_{2.5}$ may cause health hazards when inhaled in significant amounts and can also reduce the visibility. This impact is moderate, local and will be short term.

Mitigation measures

- Restrict demolition activities to specific time periods during the day when noise impact is likely to be less disruptive, such as during normal working hours. This can help minimize the disturbance to both site workers and residents
- Inform and engage with residents and workers in the surrounding areas about the timing and nature of the demolition work. Providing regular updates and addressing concerns can contribute to better community understanding and cooperation.
- Implement a comprehensive air quality monitoring system to track the emission of dust particles during demolition. This can help identify any exceedances of air quality standards and trigger immediate corrective actions.
- Dust suppression techniques, such as water spraying or misting systems, to control the release of dust particles into the air. This can help mitigate the impact on air quality and reduce potential health hazards.
- Provide site workers with appropriate PPE, such as masks or respirators, to minimize their exposure to airborne particulate matter and protect their health during the demolition activities.

6.7.5 Healthy hazards to workers from demolishing work

Demolishing works will include activities that may generate substantial amounts of dust and may also pose workers to risks of accidents. Pulling down a structure, engineered foundations, and other structures will all lead to generation of dust, noise and may cause accidents to operators. This impact is considered as negative, short-term, adverse, reversible and of moderate significance.

Mitigation measures

- Personal protective equipment (PPE), e.g., helmets, boots, goggles, earplugs, gloves and others will be provided and their use enforced to all workers involved in demolishing of structures during closure.
- Contractor shall have registered and qualified HSE personnel to ensure health and safety of workers within the project area.
- All workers involved in the demolishing work will be provided with training on health and safety matters

- In case of injuries, a well-equipped first aid kit will be onsite and injured workers will be provided first aid service by a trained first aider
- Hygienic conditions within the working areas will be maintained and enforced

6.8 Cumulative impacts

Cumulative impacts are incremental changes caused by the project together with other presently ongoing, or reasonably foreseeable future planned actions/projects within the Project Area. Cumulative impacts act with others in such a way that the sum is greater than the parts. This is, however, not always the case – sometimes they will simply be the sum of the parts, but that sum becomes significant. The project will have both positive and negative cumulative impacts during its implementation as a direct result of the project. The nature of cumulative impacts can be both temporary in nature (restricted to the construction phase) and permanent (occurring in both the construction and operation phases).

6.8.1 Cumulative Socio-Economic Impacts

a. Positive Cumulative Socio-Economic Impacts

The proposed new classrooms, cafeteria and laboratories etc. are likely to have similar impacts to existing classrooms, cafeteria and laboratories during the operation phase. Thus, the proposed project will increase students' enrolment, revenue collection and enhanced learning environment during the operation phase as follows;

- The cafeteria will enhance availability of safe and reliable food service to staff and students. Apart from that, the project will increase revenue collection by the university, and boost the economy of those operating the cafeteria, hence cumulative economic benefits.
- The academic buildings will provide safety, easy accessibility to classrooms and reduce negative social interaction with the outside community. The university buildings will also enable the university to increase students' enrolment.

Together, the two above will increase revenue collection by the University and hence facilitate growth and a competitiveness in the market. Furthermore, no other developments have been identified in the study area, which could give rise students enrolment or enhance the learning environment.

b. Negative Cumulative Socio-Economic Impacts

The proposed project will definitely increase the population at the university campus. These are students, vendors, and staff from different social backgrounds. Such interactions existing at the University are currently managed by different units at the University (i.e., gender unit, dean of students etc.). The increased number of people will cumulatively increase the impacts of social interactions between students/ staff/vendors and visitors at the campus. Such impacts may include cumulative increase in communicable diseases (HIV, AIDS and other STDs as well as COVID 19 outbreak) and cumulative increase in theft, crimes and other security issues.

6.8.2 Cumulative impacts of Bio- physical environment

6.8.2.1 Cumulative impacts of liquid and solid waste

Ongoing activities at the University generated significant solid and liquid wastes. The increased number of people at the campus will result to cumulative increase to generation of both liquid and solid waste at the campus. This will increase deterioration of soil and water bodies.

6.8.2.2 Incremental noise and air pollution

The main sources of noise and air emissions at the campus are traffic and standby power generators. The proposed project shall definitely contribute to increase traffic flow within the campus, both during construction and operation.

The proposed infrastructure shall be provided with standby power generators. These shall cumulatively increase noise levels and exhaust gasses emissions within the MU, Main campus.

6.8.2.3 Greenhouse Gas Emissions and Climate Change

Greenhouse gas emissions has a major influence on climate. Naturally occurring greenhouse gases such as Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O) and Ozone (O_3) play a key role in trapping the sun's heat, thereby maintaining the earth's temperature range necessary for life. Project implementation activities contribute to greenhouse gas emissions through the use of equipment, plants and vehicles during the construction phase. Also, the electricity use is associated with greenhouse gas emissions. On the other hand, the increasing vegetation clearance during construction and operation phase reduce Carbon sequestration potential, hence reducing efforts towards climate change mitigation.

6.9 project alternatives

Alternatives to projects are different ways to achieve the same purpose that the project intends to achieve. Environmental and Social Assessments require looking into alternatives to the projects in order to make prudent decisions.

The project alternatives are a part of the ESIA process to select the best among all possible project options. The alternatives of a project are defined as the options that can help to meet the objectives of a project by different means including an alternative project site, technology or material, waste management, design or inputs and roofing materials. The key criteria when identifying alternatives is that they should be feasible and reasonable.

FACTORS CONSIDERED

a. **Existing policies, legislation and standards regarding construction project based on buildings and other infrastructures in Tanzania.**

A review of available policies, legislation and standards of construction in Tanzania was carried out to ensure that the proposed establishments at MU conforms with the required standards. This was done to ensure the safety of the buildings.

b. **Environmental considerations**

Environmental factors were also considered in the choice of building materials, citing of other facilities such as wastewater treatment facilities and choice of wastewater treatment technologies.

This was done in order to ensure that the project does not cause irreparable damage to the environment.

c. Cost benefit analysis

An analysis of technologies to be used was done to ensure that the amount of money that was budgeted for the project is adequate. However, this was done without compromising the quality or safety of the buildings.

d. Location and layout alternatives

The location and layout alternatives were not considered since the construction works will take place within the premises where other structures for MU, Main campus exist and therefore alternative sitting and layout was not an option.

Below is the discussion of project alternatives that has been considered in relation to the proposed establishment.

6.9.1 No Project Alternative

The no project alternative entails retaining the current status quo (No construction of the proposed six buildings at MU, Main campus). Adopting the No Project alternative, this option would mean avoiding the predicted impacts of the project implementation, and missing the predicted positive impacts of the project. The HEET project at MU is designated to revitalize and expand the capacity of the University to contribute to key areas for innovation, economic development and labour market relevance. The proposed establishment is expected to enable effective teaching and research, and produce graduates who could become a catalytic force for the new industrial based economy of Tanzania.

Hence, the proposed establishment has many potential benefits as compared to negative ones that can be easily mitigated.

6.9.2 Alternative Site

As presented in Chapter 2 of this report, the proposed four structures will be located within the MU Main Campus. The option of utilizing an alternative site out of the campus was considered but over-weighted by the existing land at the university due to the following advantages over other;

- Ownership of the project area. This area for the proposed establishment is the property of the MU as such it does not involve complicated issues of displacing people, compensation and settlement.
- The land located meets the user requirements for developing MU facilities based on MU-Main Campus Mater Plan and land use stated in the title deeds.
- The site is located on a favorable piece of land; large area with a clear view
- The site is well served with road network and it is easily accessible to public transport; and
- Availability of water and electricity mains supply.

Even within the campus, several locations were considered against provision/availability of services such as waste management, water and power supply; location with respect to location of other structures and environmental protection. The following are the advantages of the selected sites over any other location within the campus;

- The selected sites allow integrated management of generated solid and liquid wastes (both onsite and offsite);
- Accessibility to water and energy: to be taped from a main towards the existing facilities
- Site selection considered areas, which have less vegetation cover, and avoided densely dares. The proposed site is already a disturbed area.

6.9.3 Alternative Construction Technologies

Within the construction sector, various options exist for selecting building materials. The decision regarding building materials can significantly influence factors such as longevity and aesthetic appeal of structures, construction costs, and environmental impact. In this context two alternatives were evaluated; the utilisation of burnt bricks and concrete bricks.

6.9.3.1 Use of burnt bricks

In Tanzania, use of burnt bricks is cheap because they are locally made and can be close to the project sites. The traditional fired/burnt bricks are made from soil that is mixed with water, dried in the sun there after baked using wood fuel.

Advantages of burnt bricks

a) Bricks are strong and durable;
b) They require low maintenance cost;
c) Have excellent thermal mass i.e., in winter they keep the buildings warmer while in summer they keep the buildings cooler; and
d) They are fire resistant.

Disadvantage of burnt bricks

For large projects, large amounts of firewood and soil will be required to produce adequate number of bricks. This can lead to destruction of natural forests and land degradation due to formation of borrow pits.

6.9.3.2 Use of Concrete blocks

Concrete blocks are made from a mixture of quarry dust and cement to which water has been added. Then the mixture is compacted using a manual machine to ensure strength and quality.

Advantages of Concrete blocks

a) Concrete blocks allow users to produce uniform blocks of greater strength;
b) Concrete blocks can be made on site so transportation costs are minimized; and
c) Because Concrete blocks are cured in the sun, there is no fuel needed thereby helping to curb deforestation as such they are environmentally friendly;
d) Concrete blocks are strong and durable; and Concrete blocks are fire resistant

Disadvantage of concrete blocks

a) The bricks are usually expensive due to increased costs of cement.

6.9.4 Water supply Alternative

6.9.4.1 Water Supply (surface water) from the MU Independent water source (Tangeni river

Water supply from MU Independent source (Tangeni river) is the option considered to be appropriate as the water supply network is within the campus and therefore can guarantee reliable, clean and safe water supply to the proposed buildings.

6.9.4.2 Groundwater Extraction (Boreholes)

Statistics from Mvomero District Council and within the vicinity of the proposed establishment area suggest that ground water is another alternative option for water supply and can supplement the water supply at the project site at such times of water shortage and scarcity.

It has to be noted that before establishing the groundwater as sources of water supply, an investigation in terms of groundwater quantity and quality has to be thoroughly carried out and ascertained. Ground water investigation and well drilling have cost implications on the project. Further, based on water quality data from MU independent water source, utilisation of ground water will necessitate investing on water treatment plant/equipment.

6.9.4.3 Rainwater Harvesting

The project considered rainwater-harvesting potential as alternative source of water. It is proposed to harvest rainwater from both roof and land catchment. It will entail the design of rainwater harvesting system and underground water storage tanks. Although this may demand more investment (capital), its operation costs are relatively low. Rainwater harvesting is one of the best ways to reducing surface runoff and soil erosion.

Conclusion: *The University opted to use independent water sources from Tangeni river.*

6.9.5 Alternative Energy Sources

The main source of energy for the university is Electricity, supplied by the national grid. For the proposed infrastructure, the University considered four alternative sources of energy namely; electricity, diesel power generators, and solar energy.

- ***Alternative one - Electricity:*** 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.
- ***Alternative two - Diesel generators:*** These utilize fossil fuels, which tend to emit greenhouse gases especially when operated for a long time. As such, diesel generators are used as standby power supply during outages.
- ***Alternative three - Solar energy****:* the last alternative considered was the installation of solar panels to harvest solar energy. It is intended that the solar energy be used for lighting within the buildings. It is also intended to install solar lights in various locations along the streets.

Conclusions: an evaluation of the three alternatives based on capital costs, availability of adequate supply, reliability, and environmental protection revealed that at least three options could be used together. Therefore, it is planned to connect the proposed infrastructure to electricity from the National grid as a basic power supply and backup generator. Provisions will be made for installing solar panels in the future. Hence, contractor during design period of the proposed establishment

should consider space for installation of solar pannel in the future.However number of solar pannel to be insatalled is not estimated.

6.9.6 Alternative of liquid waste management

During the operational phase, it is anticipated that the daily wastewater about 2,894.4m^3 will be produced if the population projection regarding the MU Masterplan was yet done. The estimation is based on the assumption that an average individual generates approximately 80% of wastewater per day. Therefore, it is crucial to address the appropriate management and disposal of this wastewater volume. Given that the majority of areas in Mzumbe lack connections to a sewerage system for this wastewater treatment, alternative options such as utilisation of septic tanks and wastewater stabilisation ponds have been considered and will be discussed as follows;

6.9.6.1 Use of septic tanks

Use of septic tanks to manage wastewater was one of the options that were considered. Advantages of using septic tanks over wastewater stabilisation ponds (WSP) include;

- Septic tanks are easier to operate than WSP as such they do not require personnel to manage its operations except when there are blockages;
- Septic tanks do not generate odor as they are usually under cover;
- Septic tanks do not require a lot of space as compared to WSP; and
- Septic tanks are not left open as the case is with WSP which become breeding ground for vector insects and pose as potential hazards to the general public and children in case of drowning.

The main disadvantage of using septic tanks is that they need periodic emptying, and this could raise the operation cost over time. With the large volume of effluents that will be discharged from the project during operation, the septic tanks will need to be emptied time and again making the alternative not viable.

6.9.6.2 Use of wastewater stabilisation ponds

Use of wastewater stabilisation ponds is one of the commonly method used of treating wastewater. Although this is one of the cheapest ways of treating wastewater, the method requires more space than the other wastewater treatment facilities. Since space is not a limiting factor for the project, this is a preferred option.

Advantages of using WSP include

a) As compared to septic tanks, WSP do not require emptying of wastewater as it is discharged into the environment after its treatment;
b) Cheap and easy to operate;

Disadvantages of using WSP include

a) WSP require more space than other wastewater treatment facilities;
b) If not properly managed, wastewater stabilisation ponds result into breeding grounds for mosquitoes;
c) Can generate odour if the system is not operating effectively; and

d) Has the potential to pollute recipient water body if there is system failure as such it needs personnel to manage to ensure that it operates effectively and efficiently;

Conclusion

Considering that the campus has enough space to accommodate the wastewater stabilisation ponds away from other structures such as class rooms, students' hostels and the administration block, the alternative was preferred (MU- Main Campus Master Plan).

6.9.7 Solid Waste Management Alternatives

The proposed establishment will generate a considerable large amount of solid waste from hostels, stationeries, workshops, laboratories, restaurants and offices. The University considered three alternatives namely;

- Construction of composting facility for biodegradable waste like food remains from cafeteria.
- Collected by the Mvomero District Council.
- Collection, sorting, resource recovery and transportation of remaining waste to is done by Mvomero District Council for final disposal.

Alternative I; Alternative one will involve transportation of huge amounts of waste to the proposed composting facility within MU, Main campus. Composting facility will be used for the controlling decomposition of organic waste such as food remain from cafeteria, yard trimmings and other sources within campus. This composting facility will facilitate the natural breakdown of organic matter into nutrient-rich compost, which later on will be used as a soil amendment. Properly managed composting facilities will minimize odours and prevent the release of greenhouse gases

Alternative II: Alternative two will involve transportation of huge amounts of waste to the dumpsite. Since solid waste management is a service and doesn't generate any revenue, such practice will become a burden to the University. The generated amount will require at least one trip per day by District council which is about 40 km from the university which is so far hence this alternative is not possible for MU to implement and prefer to establish their own management system known as Composting facility. Therefore, alternative two was not preferred due to distance and time.

Alternative III: alternative three will involve integrated solid waste management; where by management will start with:

- Efforts to reduce waste generation.
- Waste segregation and sorting into degradable and non-degradable; and recyclables and non-recyclables.
- Waste recycling: at this stage, all recyclables' wastes will be collected and sold to recycles (includes papers and plastic containers).
- The remaining non-decomposable and no recyclables will be stored on site in constructed chambers, before it is final disposal.

Conclusion: Analysis of the three alternatives showed that alternative I &III is the most favourable because waste will be categorized based on their characteristics and disposed accordingly.

6.9.8 Alternatives building materials

- It is estimated that building materials account for more than 70% of the total building cost, therefore, the selection of affordable building materials is critical important.
- MU considered all these and looked into a variety of building materials for different aspects of the proposed buildings. Architects consulted with structural engineers on the load-bearing capabilities of available materials. Five common materials namely *concrete, steel, wood, masonry and stone* were considered as briefly described hereunder:
- ***Concrete:*** Concrete is a composite material made from fine and coarse aggregates, bonded together with cement. Its versatility, cost and strength make it the ideal material for building foundations. It is most preferred since it can carry heavy load and withstand harsh environmental conditions its
- ***Steel:*** Steel is a metal alloy of iron and carbon and often-other alloying material in its composition to make it stronger and more fracture-resistant than iron. Because it is so strong compared to its weight and size, structural engineers use it for the structural framework of tall modern buildings and large industrial facilities
- ***Wood:*** Among the oldest, or perhaps *the* oldest, of building materials, wood has been used for thousands of years and has properties that make it an ideal building material—even in the days of engineered and synthetic materials.
- ***Stones:*** The longest lasting building material available is the one that's been here for thousands of years: stone. In fact, the most ancient of buildings still in existence in the world are made of stone.
- **Brick/masonry:** Masonry construction uses individual units (such as bricks) to build structures that are usually bound together by some kind of mortar. The strongest and most commonly used masonry unit is a concrete block, which may be reinforced with steel. Glass, brick, and stone can all be used in a masonry structure.

Conclusion*:* A team of Architects and Engineers evaluates these based on criteria such as *strength, weight and durability*, which would make it right for various uses; compatibility with National standards and testing methods that govern the use of building materials in the construction industry; consideration for structural integrity and cost and aesthetics. The University opted a combination of two of the construction materials i.e., concrete (for foundations, floors and columns) and Brick/masonry for walling.

6.9.9 Alternatives roofing materials

Roofing is a crucial part of the building construction. Every construction requires a stable and strong roof and should have the ability to protect the structure from natural conditions. The University and contractor should considered various options in terms of roofing materials, among these coated *aluminum roofing sheets* and *clay roofing tiles*. The two materials were evaluated based on costs, availability, whether resistance, longevity, flexibility and corrosion resistance.

Conclusion: Although roofing tiles will score more points in terms of whether resistance, longevity and resistance to corrosion, they were found to be more expensive that aluminum roofing (i.e., per square meter). Aluminum roofing sheets scored more point on capital costs, flexibility and less

labor-intensive during installation. Therefore, the University opted to use corrugates aluminum sheets for roofing.

CHAPTER 7: ENVIROMENTAL AND SOCIAL MANAGEMENT PLAN

7.1 Introduction

Mitigation measures are presented in the following ESMP (Table 7.2) that is to be implemented by MU and during construction, operation and decommissioning phases, and Contractor during construction phase. Plans for the implementation of mitigation measures for the proposed establishment are provided in this Chapter. The Plans indicate institutional responsibilities, time to take the action, monitoring frequency and estimated costs. The proposed costs are only indicative, should the proposed development proceed with the suggested changes, the developer will estimate actual costs and include them in the overall cost of the project. Based on the EMA, (URT 2004), NEMC is required to Environmental and Social Impact Management Plan (ESMP).

7.2 Purpose of the ESMP

The purpose of the ESMP is to describe the measures that should be implemented by the proponent during the implementation of the project to eliminate or reduce to acceptable levels key potential impacts, social and health impacts related to project activities. The specific measures set out in the ESMP must be fully adhered to by all the project parties. In particular, the project must strive to avoid significant impacts on the bio-physical, socioeconomic or health aspects during implementation. Avoidance through good detailed design of site-specific works and through preparation of the detailed site specific ESMP will be key to success in this area. Where impacts cannot be avoided, they must be mitigated against using appropriate measures. The ESMP has been developed:

- To bring the project to comply with ESS1 and Government of Tanzania applicable national environmental and social legal requirements social policies and procedures;
- To outline the mitigating/enhancing, monitoring, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental and social impacts, or to enhance the project beneficial impacts.
- To provide an operational reference and tool for environmental management during project rehabilitation and operation activities.

7.3 ESMP Implementation Responsibility

The environmental and social mitigation measures incorporated in the detailed engineering design shall be handed over to the contractor during construction period. The contractor shall take stock of the contents of the Environmental and Social Management Plan of the Project. MU holds the ultimate responsibility for meeting the requirements outlined in EMA 2004, Tanzania's Environmental Legislation. The primary obligation for executing these requirements rests with the contractor, who will appoint safeguard specialists overseen by a contractor resident engineer. The project proponent is tasked with ensuring the presence of adequate resources, skills, training, capacity-building programs, communication processes, and documentation control systems to ensure the effective implementation and integration of ESMP requirements. This involves having competent staff with sufficient training and experience to cover the ESIA requirements for the HEET project in the designated project area.

MU-Project Implementation Unit (MU-PIU) is responsible for assessing the management and execution of the ESMP through monitoring and environmental audits. Any identified non-compliance during the evaluation requires corrective action by the contractor. The MU-PIU oversees the implementation and monitoring of the ESMP, with overall responsibility for supervising all environmental management activities, aided by consultants (WB POM, 2021).
It is essential to note that the ESMP is not the sole document or management system tasked with addressing project impacts. Instead, each project-related subcontractor or material supplier must establish their own management systems to minimize and prevent environmental and social risks.

Therefore, the contractor must integrate the ESMP into their "project management system," which serves as the framework for managing their activities and prepare C-ESMP. This system defines responsibilities, internal reporting requirements, relationships for mitigation and monitoring actions related to the ESMP, and precise mechanisms for monitoring and evaluating the implementation of various ESMP requirements. The contractor is also obligated to ensure that project implementation complies with national and international EHS legislation and regulations, as well as contractual technical and quality specifications in line with the project's quality plan if required. Also, the contractor shall appoint an Environmental, Social, Health and Safety Officer to oversee the E&S aspects who are familiar with the compliance requirements, including WB EHS guidelines (WB POM, 2021).

The successful execution of this plan will necessitate extensive self-monitoring and regular reporting to the PIU. It is anticipated that, throughout the project implementation stage (construction), both the MU and contractor will enlist the services of consultants, including environmental and social specialists, as well as environmental health and safety officers (EHS). These personnel will be appointed based on the specifications outlined in the following table for effective management and monitoring.

7.4 Environmental and Social Cost

The costs for implementing the mitigation measures have been estimated based on previous similar projects and engineering judgment. The estimated cost for environmental and social management of an establishment is to be included in the Contractor's Bill of Quantities (BOQ) during decommissioning. Also, the principal environmental and social cost includes the cost for implementing the mitigation measures proposed. Additional costs for implementing environmental and social management measures have been estimated and MU shall cover all the costs proposed in the ESMP.

Table 7.1: Proposed Environmental Social Management Plan (ESMP for Mobilisation, construction, demobilization, operation and maintenance, and decommissioning phase.

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
MOBILISATION PHASE				
SOCIAL IMPACTS				
1	Job Creation and employment opportunities	○ The contractor will be urged to hire as much local labor that is unemployed but willing to work hard as possible, up to a maximum of 50% unskilled labor. This will guarantee that the initiative benefits the local population better. ○ Employment should be based on the idea that everyone should have equal access to opportunities. ○ Communities close to the project site will be urged to develop high-quality goods and services. ○ Opportunities for employment will be made available in accordance with qualifications, accepted interviewing procedures, and grading systems. ○ Conduct fair and transparent recruitment processes to ensure equal opportunities for all interested individuals, promoting inclusivity and diversity Local communities shall be encouraged to produce quality goods and services for the project. ○ Implement training programs to enhance the skills of the local workforce, ensuring they acquire the necessary qualifications for available job opportunities. ○ Ensure strict adherence to labor standards and regulations, providing a safe and supportive working environment for all employees ○ Both professional and unskilled laborers hired for the project should receive fair remuneration.	Contractor/ MU-PIU / Consultant	N/A Part of its project
2	Increased Business/trade opportunities	○ Encourage the project to prioritize the procurement of goods and services from local businesses. This can include construction materials, equipment, and various services required during the mobilization phase.	Contractor/ MU-PIU / Consultant	N/A Part of its project

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		o Implement training programs to equip local residents with skills relevant to emerging market opportunities. This can include workshops on entrepreneurship, vocational training, and business management. o Promote environmentally and socially sustainable business practices to ensure that the increased market opportunities contribute to long-term economic and community well-being o Implement fair and transparent procurement processes to ensure that local suppliers have equal opportunities to participate. This can include clear guidelines, open bidding processes, and fair evaluation criteria o Ensure monitoring of labour standards among contractors, sub-contractors, workers and service providers; and o Qualified local vendors/ entrepreneurs should be given priorities to supply different goods and services to the project.		
3	Increased Revenues to local authorities	o Local authorities can strategically plan and implement tax structures that ensure optimal revenue collection during the peak construction activities. This may involve revising tax rates on construction-related transactions and services o Promote local economic development projects that align with the construction activities to sustain economic transactions beyond the construction phase. o Encourage local businesses to provide goods and services required for the construction, fostering a symbiotic relationship. o Awareness creation for the people in the area on the importance of paying revenues.	Contractor/ MU-PIU / Consultant	N/A Part of its project
4	Disruption of Economic and Social Activities	o Inclusion of local leaders (Ward/sub-ward chairpersons/executive officers or /and councilors. o Introduction of traffic management plan and routing traffic flow to alternative roads will reduce the impact. o Exploring alternative routes or diversions with proper simulation before implementation. o Provision of temporary traffic lights and flagmen will also reduce the impact.	Contractor/ MU-PIU / Consultant	10,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Contractor shall Develop and implement a comprehensive traffic management plan to minimize disruptions along the road. This plan should include designated routes for construction vehicles and scheduling deliveries during non-peak hours ○ Contractor shall conduct awareness programs for the local community, including food vendors, passengers, drivers, and students, to inform them about the upcoming disruptions. Provide information on alternative routes and timing to minimize inconvenience ○ Environmental and Social Specialists of MU should explore the possibility of temporarily relocating key services, such as food vendors or public transportation, to less affected areas during the mobilization phase. This can help maintain essential services without significant interruption ○ Establish effective communication channels between the construction team and the local community to address concerns and provide real-time updates on construction activities. This fosters transparency and community engagement. ○ Introduction of traffic management plan and routing traffic flow to alternative roads will reduce the impact		
5	Increased level of crimes	○ Employ people from the surrounding areas to reduce number of migrant workers. ○ Establish community-based security in collaboration with mtaa/ward leaders. ○ The contractor shall establish his own security to protect his properties and should establish community policing to support insufficient police force. ○ The community should be encouraged to participate in security matters by providing information on suspects. This can only be done by making community to own the project as well. ○ The cooperation of local people together will help to lessen criminal incidents and maintain security of people and their properties. ○ Participatory community security measures (ulinzi shirikishi) should be encouraged in the surrounding communities of Changarawe, Vikenge and Tangeni village.	Contractor/ MU-PIU / Consultant	2,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		o Deploy trained security personnel to monitor the construction site, deterring potential thieves and enhancing overall security. o Install surveillance cameras strategically across the construction site to monitor activities and provide evidence in case of theft or security incidents o Implement strict access control measures, limiting entry points and ensuring that only authorized personnel have access to the construction site. o Install adequate lighting around the construction site to minimize areas of darkness, reducing the likelihood of unauthorized access and theft. o Foster a positive relationship with the local communities by involving them in the construction process, creating a sense of ownership and reducing the likelihood of theft. o Establish secure storage facilities for construction materials and equipment, ensuring they are locked and well-protected when not in use. o Conduct regular security audits to identify vulnerabilities and make necessary improvements to the security infrastructure		
6	Prevalence of Communicable diseases	o Provide awareness to public on pathways communicable diseases. o Provide Voluntary Counselling and Testing (VCT) centers for HIV/AIDS at MU and the surrounding communities. o Ensure that the Code of Conduct and corresponding training concerning commitment of labour towards the community and the different behaviour that should be avoided emphasizes zero tolerance of gender- based violence (GBV) i.e. sexual harassment, sexual exploitation and sexual abuse, STDs o Ensure that the Code of Conduct and corresponding training concerning commitment of labour towards the community and the different behaviour o Work close to government and private institutions that deal with the spread of communicable diseases o Provide more healthcare services and medical equipment for treatment. o Work close to government and private institutions that deal with the spread of communicable diseases.	Contractor/ MU-PIU / Consultant	5,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Provide easy access to free or affordable condoms on the construction site and within the local communities to encourage safe sexual practices and reduce the risk of STDs, including HIV/AIDS. ○ Establish regular health screening programs for construction workers to detect and address any potential communicable diseases early. This can include HIV testing, counseling, and access to medical care. ○ Foster community involvement in promoting health awareness and responsible behavior. Engage community leaders to support initiatives that discourage risky behaviors and emphasize the importance of health in the long term. ○ Implement campaigns to reduce the stigma associated with HIV/AIDS and other communicable diseases. This can help create a supportive environment for affected individuals to seek testing and treatment without fear of discrimination. ○ Increase security measures to discourage the influx of sex workers to the construction area. This may involve collaboration with local law enforcement to maintain a safe and secure environment.		
7	Increased Traffic and road accidents operators and drivers	○ The contractor should ensure the proper selection of appropriate transportation route with consultations with stakeholders, avoiding large agglomerations as well as good Site Practices such as signage and signal personnel where appropriate and vehicle lighting (front and back). ○ Contractor shall develop a comprehensive traffic management plan to regulate the flow of vehicles and minimize congestion during the mobilization phase. ○ Contractor should coordinate and schedule deliveries of building materials and equipment during off-peak hours to reduce the impact on regular traffic. ○ Implement reduced speed limits in construction zones and install clear signage to alert drivers about the presence of construction-related activities ○ Conduct public awareness campaigns to inform local residents, businesses, and commuters about the upcoming construction activities and potential traffic disruptions.	Contractor/ MU-PIU / Consultant	N/A Part of its project cost

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Work closely with local traffic authorities to monitor and manage traffic flow effectively, ensuring the safety of both construction personnel and the general public ○ Encourage and facilitate alternative transportation methods for construction workers to reduce the number of individual vehicles on the road. ○ Establish emergency response protocols to promptly address and manage any road accidents that may occur.		
ENVIRONMENTAL IMPACTS				
8	Loss of vegetation due to exploitation of borrow pits/quarries and other natural resources	○ Develop a comprehensive reforestation plan to replace cleared vegetation. ○ Close supervision of earthworks shall be observed in order to confine land clearance within the project site. ○ The contractor shall be instructed to give the uprooted trees to the residents through ward/village governments or any other arrangement may seem convenient provided he does not contravene the Forest Acts 2002. ○ Appropriate landscaping programs must be planned and put into action in order to aid in the re-vegetation of a portion of the project area following construction shall be designed and implemented. ○ Encourage the retention of vegetative cover by avoiding complete bulldozing to ground level. ○ Implement low-impact construction methods that minimize disturbance to existing vegetation. ○ Implement efficient resource management practices to minimize the extraction of building materials. ○ Ensure that building materials are sourced from legitimate and sustainable suppliers to prevent unauthorized exploitation of natural resources ○ Monitor and control water and energy use to minimize additional demands on these resources. ○ Explore alternative sources for building supplies to reduce the impact on indigeneous trees.	Contractor/ MU-PIU / Consultant	N/A Part of its project cost

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Implement reforestation and restoration programs post-construction to rehabilitate affected areas and enhance environment ○ Raise awareness among local communities about the importance of preserving natural resources and involve them in conservation efforts. ○ Ensure strict adherence to environmental regulations and guidelines to prevent overexploitation and degradation of natural resources		
9	Contamination and Impaired Quality of Receiving Body- Land and Water	○ Efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at project areas; ○ Introduction of waste disposal bins, warning notices, posted at strategic points; ○ No, on site burial or open burning of solid waste shall be permitted; ○ Wastes not suitable for incinerations and general municipal waste dumping (e.g., Batteries, plastics, rubbers, tyres, etc.) shall be removed for recycling, treatment, and/or disposal by licensed contractor as appropriate; and ○ Instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste during bidding process. ○ Wastewater from toilets should be well managed through the proper managed septic tank and soak pit treatment.	Contractor/ MU-PIU / Consultant	20,000,000
10	Increased Air pollution and climate change	○ Implement the use of cleaner fuels and advanced technologies for construction machinery and transportation to reduce emissions of CO2, NOx, and fine particulates ○ Prioritize the preservation of existing vegetation and implement a comprehensive tree planting program to offset the loss of trees during construction ○ Install and enforce effective emission control devices on diesel-powered trucks to minimize the release of pollutants into the air. ○ Optimize construction site management practices to minimize the duration and intensity of activities that contribute to air pollution, such as efficient scheduling and material storage	Contractor/ MU-PIU / Consultant	8,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Conduct awareness campaigns for the local community and workers regarding the environmental impact of air pollution and climate change, promoting sustainable practices ○ Establish a comprehensive monitoring system to regularly assess air quality and emissions during construction. Report findings to relevant authorities and the community		
CONSTRUCTION PHASE				
SOCIAL IMPACTS				
1	Jobs creation and Employment opportunities	○ Ensure that the contractor prioritizes the hiring of local residents, both skilled and non-skilled, from Changarawe, Vikenge, and Tangeni village. ○ Collaborate with local employment agencies to identify qualified candidates within the community. ○ Implement training programs to enhance the skills of the local workforce, enabling them to qualify for skilled positions and fostering long-term employability ○ Establish contractual agreements/code of conduct with the contractor to adhere to the employment targets, ensuring the stipulated number of skilled and non-skilled laborers are hired from the local community ○ Facilitate the growth of self-employment opportunities by encouraging the establishment of businesses such as restaurants and food vendors to meet the increased demand generated by the project ○ Encourage the contractor to contribute to community economic development initiatives, such as supporting local businesses and entrepreneurs, thereby fostering long-term economic resilience ○ Implement a monitoring and reporting system to track the employment impact throughout the construction phase, ensuring compliance with the outlined measures	Contractor/ MU-PIU / Consultant	N/A Part of its project cost

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
2	Income to local suppliers and service providers	o Purchasing materials from as many local suppliers. o Prioritize hiring local workers for various construction-related tasks, contributing to increased employment opportunities in Mzumbe ward. o Provide training and support to local suppliers and service providers to enhance their capacity to meet the increased demand o Actively involve and engage local suppliers for construction materials needed during the establishment phase. o Provide training and support to local suppliers and service providers to enhance their capacity to meet the increased demand o Implement fair and transparent procurement processes to ensure that local suppliers have equal opportunities to participate in supplying materials and services for the project o Integrate environmentally sustainable practices in construction to minimize negative impacts on the local environment, ensuring long-term benefits for the community. o Maintain open and transparent communication with local suppliers and service providers to address any concerns and ensure that they are well-informed about project developments.	Contractor/ MU-PIU / Consultant	N/A Part of its project cost
3	Increased skills and impart knowledge to local communities	o Develop and implement structured training programs for both skilled and non-skilled laborers in the local communities. o Contractor shall provide on job skills and training. o Actively engage the local workforce in construction activities, providing hands-on experience with new equipment and technologies o Implement capacity building initiatives to equip individuals with essential skills required for their roles in the construction process o Establish a system for continuous monitoring and evaluation of the training programs to ensure their effectiveness o Involve local communities in the planning and execution of skill development initiatives to ensure relevance and sustainability.	Contractor/ MU-PIU / Consultant	N/A Part of its project cost

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		o Implement a monitoring and evaluation system to track the effectiveness of the skills transfer programs. o Regularly assess the impact on individuals and the community to make necessary adjustments for continuous improvement.		
4	Occupational Safety and Health impacts	o Institute good site practices include preventing public access to the construction site by securing equipment and demarcating excavation, using warning signs with appropriate text (local language) and graphic displays. o Contractor should have registered and qualified health and safety personnel in the project during construction phase. o Contractor shall develop and implement C-ESMP o Develop and implement emergence preparedness and response plan o Implement traffic management and safety initiatives, such as heavy truck operator and driver training and testing, speed limit enforcement, maximum load limitations, and adherence to all Tanzanian transportation laws and standards. o Awareness campaigns /Education on HIV and STDs shall be provided to workers; o Appropriate working gear (such as nose, ear and mouth mask and clothing) and good construction site management shall be provided. o The contractor is responsible for barricading the building site, maintaining it hygienically, and providing enough facilities, such as trash cans, fire extinguishers, and a clean, safe water supply. o A well-stocked First Aid kit (administered by medical personnel) shall be maintained at the construction site. The medical personnel shall also be responsible for primary treatment of ailments and other minor medical cases as well as providing health education to the workforce. o The establishment of reporting systems for the public to voice concerns or grievances over perceived hazards to their health and safety caused by the construction operation.	Contractor/ MU-PIU / Consultant	25,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		o There will be proper signs on site to warn workers of safety requirements as regards machines with moving parts and other equipment at site. o Develop and implement an emergency plan including spill response. o Safe scaffoldings and railings will be provided at heights. o Creating a thorough health and safety plan and educating all contractor employees on it.		
5	Community Health, Safety and Security impacts	o Contractor should have registered and qualified health and safety personnel in the project during construction phase. o Develop and implement community health and safety management plan o Establish a health and safety monitoring system to ensure that workers comply with health protocols and minimize the risk of communicable diseases, including regular health check-ups and screenings. o Contractor shall develop and implement C-ESMP o Develop and implement emergence preparedness and response plan o Implement a comprehensive training program for all construction workers, emphasizing the importance of adhering to safety protocols, respecting local communities, and following a code of conduct to minimize negative impacts. o Implement disease prevention programs, including awareness campaigns and access to healthcare facilities, to address potential increases in diseases such as COVID-19 and HIV/AIDS. o Collaborate with local law enforcement to enhance security around construction sites, addressing concerns related to crime, prostitution, and alcohol abuse. Implement security measures within labor camps to ensure the safety of workers and the community. o Develop a comprehensive traffic management plan to mitigate the risks associated with increased traffic volume during the construction phase. This includes speed limits, road signage, and coordination with local authorities to enforce safety measures.	Contractor/ MU-PIU / Consultant	25,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Conduct regular health impact assessments to monitor and address any emerging health issues within the project area, ensuring a prompt response to potential risks. ○ Properly manage labor camps to ensure adequate living conditions, sanitation facilities, and medical services for imported skilled workers, reducing the likelihood of negative impacts on local communities. ○ Work closely with local authorities to monitor and regulate prices of goods and services to prevent unjustified increases, ensuring that the local community is not adversely affected by inflation. ○ Foster collaboration with local authorities, community leaders, and relevant stakeholders to jointly address emerging challenges, promote transparency, and ensure that the project's social impacts are effectively managed.Creating drainage channels to direct storm water movement. ○ Creating stone pitching where soils have been excavated		
6	Conflicts and grievances	○ Conduct workshops and awareness programs for construction workers on cultural norms and local sensitivities, emphasizing respectful behavior towards married women and school children. ○ Contractor shall develop and implement GRM ○ Implement a structured grievance resolution mechanism that allows local community members to express concerns related to construction activities. This mechanism should ensure prompt and fair resolution of issues ○ Implement effective dust control measures, such as water spraying and covering construction materials, to minimize the impact on the local environment and address concerns about dust and flying stones ○ Organize regular meetings between construction project representatives and the local community to discuss ongoing activities, address concerns, and foster open communication	Contractor/ MU-PIU / Consultant	5,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Appoint a dedicated community liaison officer who serves as a point of contact between the construction team and the local community, facilitating communication and addressing grievances promptly ○ Ensure timely and transparent communication about the construction schedule, potential disruptions, and any necessary adjustments to minimize surprises and conflicts ○ Implement regular monitoring of construction activities to ensure adherence to guidelines and regulations, with penalties for non-compliance, thereby promoting responsible conduct among construction workers.		
7	Impact on gender during employment	○ Conduct awareness programs for all project stakeholders, including workers, community members, and decision-makers, emphasizing the importance of gender equality and discouraging discriminatory practices. ○ This project will ensure that there is involvement of women in project activities. ○ Provide specific training sessions for project staff on recognizing and addressing gender biases. This includes promoting fair treatment and equal opportunities for both men and women. ○ Implement transparent and inclusive hiring practices that ensure equal opportunities for men and women in employment and project-related activities.	Contractor/ MU-PIU / Consultant	5,000,000
8	Influx of people	○ Enhance efforts to prioritize hiring from local communities (Mzumbe ward) to minimize external migration for employment. ○ Implement skills training programs for the local population to enhance their employability and competitiveness for construction-related jobs ○ A code of conduct for workers should be developed, all workers should be trained on. All types of inappropriate behavior of workers should be identified, and the importance of adhering to the code of conduct is emphasized. ○ All workers should be trained on the Code of Conduct Organize job fairs and information sessions to ensure transparent communication about employment opportunities, reducing misinformation and speculation	Contractor/ MU-PIU / Consultant	N/A Part of its project cost

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Establish regular communication channels with the local communities to address concerns, provide updates, and gather feedback on employment-related issues ○ Collaborate with local authorities to develop and enforce policies that regulate the influx of people during construction, ensuring a balanced impact on the local population. ○ Implement monitoring mechanisms to ensure fair hiring practices and adherence to the preference for local employment, with penalties for non-compliance. ○ Implement job rotation programs and skill development initiatives to ensure a diverse range of individuals can participate in the construction activities, reducing intense competition for specific roles		
9	Insecurity and theft	○ Deploy trained security personnel to monitor the construction site, deterring potential thieves and enhancing overall security. ○ Install surveillance cameras strategically across the construction site to monitor activities and provide evidence in case of theft or security incidents ○ Implement strict access control measures, limiting entry points and ensuring that only authorized personnel have access to the construction site. ○ Install adequate lighting around the construction site to minimize areas of darkness, reducing the likelihood of unauthorized access and theft. ○ Foster a positive relationship with the local communities by involving them in the construction process, creating a sense of ownership and reducing the likelihood of theft. ○ Establish secure storage facilities for construction materials and equipment, ensuring they are locked and well-protected when not in use. ○ Conduct regular security audits to identify vulnerabilities and make necessary improvements to the security infrastructure	Contractor/ MU PIU/ Consultant /LGA	5,000,000
10	Food Insecurity	○ Develop a comprehensive plan in collaboration with local communities to ensure sustainable food sources during the construction phase. ○ Strengthen local supply chains for food by working with local farmers and vendors to meet the increased demand.	Contractor/ MU PIU/ Consultant/ LGA	N/A Part of its project cost

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Implement mechanisms to monitor and control the prices of essential goods, especially food items. ○ Conduct awareness campaigns to educate the community about the potential impacts on food prices and steps being taken to mitigate the situation ○ Ensure efficient construction management to complete the project within the stipulated timeframe, minimizing the duration of increased demand for resources		
11	Child labor	○ Conduct regular monitoring of project workers in relation to health, working conditions, hours of work, minimum age, and the other requirements of national law. ○ Develop and enforce a comprehensive Labor Management Plan that strictly adheres to local and international labor laws and standards, particularly those related to the employment of minors. ○ Establish educational support programs to encourage children to stay in school and pursue their education. This can include scholarships, tutoring services, and awareness campaigns promoting the value of education. ○ Control school dropout by collaborating with the local government and schools in the Mzumbe Ward. ○ Cooperate with relevant authorities like Ministry of Labor to control child labor ○ Create awareness raising to the communities on the importance of education to the children. ○ The local authorities should develop bylaws to control the engagement of children in petty business or work in project related activities	Contractor/ MU PIU/ Consultant /LGA	5,000,000
ENVIRONMENTAL IMPACTS				
12	Impairment of air quality due to dust and gases emission	○ Implement effective dust suppression techniques, such as using water sprays or dust suppressants on construction sites to minimize the release of fugitive dust. ○ Prioritize the preservation of existing vegetation during construction to reduce the need for extensive clearance, minimizing the disturbance that contributes to dust emission.	Contractor/ MU-PIU / Consultant	10,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Cover sand and aggregate stockpiles to prevent wind erosion and reduce the dispersion of particulate matter into the air. ○ Opt for construction practices that minimize soil disturbance and dust generation, such as limiting heavy machinery movement. ○ Provide workers with appropriate PPE, including masks and respiratory protection, to safeguard their health against potential exposure to airborne particulate matter. ○ Conduct awareness programs for the local community to educate them about the temporary nature of the air quality impact, its potential health risks, and the implemented mitigation measures. ○ Establish a monitoring system to regularly assess air quality during construction, ensuring that concentrations of PM2.5 and PM10 remain within acceptable limits. ○ Develop a responsive action plan to promptly address any exceedance of emission limits or unexpected air quality issues, ensuring a proactive approach to mitigation.		
13	Contamination and Impaired Quality of Receiving Body- Land and Water	○ Efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at project areas; ○ Develop and implement waste management plan ○ Introduction of waste disposal bins, warning notices, posted at strategic points; ○ No, on site burial or open burning of solid waste shall be permitted; ○ Wastes not suitable for incinerations and general municipal waste dumping (e.g., Batteries, plastics, rubbers, tyres, etc.) shall be removed for recycling, treatment, and/or disposal by licensed contractor as appropriate; and ○ Instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste during bidding process. ○ Wastewater from toilets should be well managed through the proper managed septic tank and soak pit treatment.	Contractor/ MU-PIU / Consultant	20,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
14	Increased Noise level	○ Implement construction activities during specific time windows to minimize disruption during sensitive hours, such as early mornings or late evenings when community activities are at a minimum. ○ Install temporary acoustic barriers or soundproofing measures around noisy machinery and construction sites to contain and reduce the propagation of noise. ○ Ensure that all construction equipment undergoes regular maintenance to reduce noise emissions. Well-maintained machinery tends to operate more quietly. ○ Providing ear protection materials for the workers in noisy area. ○ Proactively communicate construction schedules and potential noise impacts to the local community. Seek feedback and address concerns to foster understanding and cooperation ○ Provide training to construction workers on the importance of minimizing noise pollution and adopting practices that contribute to a quieter working environment	Contractor/ MU-PIU / Consultant	5,000,000
15	Increased vibration	○ Explore and implement advanced construction techniques that minimize vibrations. This may include the use of specialized equipment designed to reduce ground vibrations during activities like blasting and impact pile driving. ○ Establish effective communication channels with the local community to provide timely information about construction schedules and activities that may cause vibrations. This helps residents to take necessary precautions and prepares them for potential disruptions. ○ Install vibration monitoring devices in key locations to continuously monitor ground vibrations during construction. This real-time data can be used to assess the impact and adjust construction methods accordingly to stay within acceptable limits ○ Modify construction methods to minimize vibration generation. For example, consider alternative pile driving techniques or adjust blasting procedures to reduce the intensity of vibrations	Contractor/ MU-PIU / Consultant	2,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		o Foster an open dialogue with the local community to address concerns and gather feedback. This engagement can help in refining mitigation measures based on community input and building a collaborative approach to managing the impact		
16	Generation of Solid waste	o Contractor shall provide waste handling facilities such as waste bins and skips for temporarily holding domestic waste generated at the site. o Maintaining cleanliness on site to reduce the amount of solid and liquid waste produced during construction and associated tasks. o Implement a comprehensive waste segregation system to separate recyclable materials from hazardous and non-biodegradable waste. o Adhere to proper disposal methods for hazardous substances and materials, following established guidelines and regulations. o Employ certified waste disposal services to ensure safe handling of hazardous waste o A special focus on waste minimization will be made in order to cut down on the amount of solid waste generated during site preparation and construction. o Topsoil shall be stockpiled and used for reclamation or re-vegetation at the site during landscaping. o Develop a detailed waste management plan that outlines proper disposal methods, recycling procedures, and strategies for reducing waste generation. o Ensure adherence to the waste management plan throughout the construction phases o Biodegradable waste will be gathered and disposed of by an authorized contractor, then taken to an authorized dumpsite, particularly the Masika dumpsite in Morogoro Municipal Council. Plastics and other materials suitable for recycling will be collected separately and sent for recycling o Consult Environmental Officer from Mvomero District Council/Morogoro Manicipal Council about the suitable waste dumping site.	Contractor/ MU-PIU / Consultant	1,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		o Conduct training sessions for construction and operational staff on proper waste handling, segregation, and disposal practices. o Unusable construction trash, including broken pipes, formwork, and other building supplies, will be disposed at a designated area		
17	Generations of Liquid Wastes	o Enforce and adhere to best practices in waste management to ensure that all liquid wastes are handled and disposed of in an environmentally responsible manner, minimizing health risks and pollution. o Wastewater from temporary/disposable toilet will be discharged into temporally soak away pit. o Contractor should prepare waste management plan for liquid wastes o Conduct awareness programs for the local community in Changarawe, Vikenge, and Tangeni villages educating residents about the importance of proper waste disposal and its impact on health and the environment. o Contractor shall be instructed to put in place acceptable procedure for handling hazardous waste such as oils, lubricants and non-combustible waste. o Establish a monitoring system to regularly assess the effectiveness of waste management practices during construction. Enforce strict compliance measures to ensure that all generated liquid wastes are treated and disposed of according to established standards. o Collaborate with local environmental regulatory authorities to ensure that the construction activities comply with existing regulations and standards for waste management. o Develop and implement an emergency response plan to address any unforeseen incidents or spills during the construction phase, minimizing the potential for long-term environmental damage. o Explore opportunities for reusing or recycling treated water where applicable, reducing the overall volume of liquid waste generated and promoting sustainable water management practices.	Contractor/ MU-PIU / Consultant	1,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
18	Erosion of Exposed Surfaces	○ Implement thorough compaction and resurfacing techniques during construction to minimize exposed surfaces prone to erosion. ○ Introduce erosion control measures such as the use of erosion control blankets, sediment barriers, and vegetative cover to reduce the impact of rain, trampling, and vegetation clearance. ○ Construction will be done as per engineering design and procedure of which a maximum requirement of compaction strength is achieved during the construction. That is maximum dry density (MDD) specified in the design manual by consultant. ○ Maintain gravel fill and/or re-vegetate around the structures. ○ Plan construction activities considering weather conditions to avoid exacerbating erosion during periods of heavy rainfall. ○ Most of construction activities will be done during dry weather. ○ Eng Most of construction activities will be done during dry weather.age with local communities in Changarawe, Vikenge, and Tangeni villages to raise awareness about the potential impacts of construction and involve them in decision-making processes. ○ Implement measures to protect local resources during construction to minimize disruptions to the communities. ○ Establish a monitoring system to track erosion control measures and enforce compliance with construction guidelines to prevent excessive sedimentation in runoffs. ○ Develop plans for post-construction restoration, including replanting vegetation and rehabilitating affected areas to promote ecosystem recovery.	Contractor/ MU-PIU / Consultant	N/A Part of its project cost
19	Loss of visual aesthetics	○ Avoidance and minimizing strategies for disposed wastes. ○ All structures should adhere to set standards in terms of quality, shapes, height, color etc.	Contractor/ MU-PIU / Consultant	2,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Integrate landscaping initiatives and create green spaces within and around the project site. Planting trees and maintaining natural elements will help preserve the visual appeal and soften the urbanized look. ○ Implement visual barriers such as construction fences, temporary screens, or artistic panels to shield construction activities from direct view. This will minimize the visual intrusion experienced by residents ○ Enforce strict construction schedules to limit noisy and visually disruptive activities to specific hours, reducing the impact on the community during peak times. ○ Foster open communication with the local community to gather feedback and address concerns related to visual changes. This involvement can help tailor mitigation efforts to meet community expectations. ○ If nighttime construction is necessary, use low-impact lighting to minimize light pollution. Shielding and directing lights away from residential areas will preserve the night sky's visual quality. ○ Develop comprehensive plans for the post-construction period, including the restoration of altered landscapes. This may involve replanting native vegetation and restoring natural features to enhance the visual aesthetics		
20	Loss of vegetations	○ Implement a comprehensive plan for revegetation and reforestation in and around the construction site to restore the environment. ○ Integrate green construction practices to minimize the need for extensive clearing of vegetation. ○ Explore alternative construction methods that reduce the ecological footprint. ○ Close supervision of earthworks shall be observed in order to confine land clearance within the project site. ○ Implement erosion control measures, such as the installation of sedimentation barriers and erosion control blankets, to prevent soil erosion from wind and water.	Contractor/ MU-PIU / Consultant	N/A Part of its project cost

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		o Establish a environmental monitoring program to track the recovery vegetation and ensure the effectiveness of mitigation efforts. o Conduct awareness programs to educate the local community about the importance of preserving environmental and the ongoing mitigation measures. o Regularly review and update the environmental management plan based on monitoring and feedback.		
21	Impact on natural resource (Energy and water)	o Promote the use of renewable energy sources, such as solar or wind power, to reduce reliance on fossil fuels. Optimize machinery and vehicle operations to minimize fuel consumption. o Implement recycling and reuse systems for water used in construction activities. Utilize alternative water sources, such as rainwater harvesting, to reduce dependency on municipal water. o Establish a comprehensive monitoring system to track energy and water usage throughout the construction phase o Conduct awareness campaigns to educate the local community about the importance of resource conservation during construction o Implement strict regulations and guidelines to ensure responsible resource management. Regularly assess and audit resource consumption to identify areas for improvement. o Ensure that the construction complies with environmentally friendly building standards. Implement rainwater harvesting, energy-efficient lighting, and insulation to reduce overall resource impact	Contractor/ MU-PIU / Consultant	3,000,000
DEMOBILISATION PHASE				
SOCIAL IMPACTS				
1	Loss of employment	o Implement skill development programs to enhance the employability of the affected workers. o Provide training in areas with high demand in the local job market. o Informing workers, the project duration when employing them	Contractor/ MU-PIU / Consultant	N/A Part of its project cost

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Establish job placement services to assist displaced workers in finding alternative employment opportunities. ○ Educating the labour force on the need to save part of their wages. ○ Paying severance benefit to all laid off workers according to the provision of the labour laws. ○ Establish community support programs to provide financial assistance or counseling services to those facing immediate economic challenges.		
2	Loss of business opportunities	○ Offer training programs to local traders and entrepreneurs to diversify their products and services. This can help them adapt to changing circumstances and explore alternative business opportunities beyond construction-related activities ○ Establish clear communication channels between the construction project management and local businesses. This ensures that businesses are informed about the project timeline, allowing them to plan for potential disruptions and adjust their operations accordingly. ○ Encourage collaboration among local businesses to create a network that can collectively address challenges and explore new business opportunities. This can foster resilience and community support ○ Facilitate the establishment of support services for construction workers, such as designated areas for purchasing food from local entrepreneurs. This ensures that some business activities can continue despite the temporary disruptions. ○ Advocate for and facilitate access to government assistance programs for affected businesses. This could include tax relief, low-interest loans, or other financial support measures. ○ Work with local authorities and businesses to develop long-term plans for economic resilience, considering potential future construction projects and identifying strategies to minimize the impact on local businesses.	Contractor/ MU-PIU / Consultant	N/A Part of its project cost
ENVIRONMENTAL IMPACTS				

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
3	Dust and noise pollution from demolishing works	○ Employ dust control technologies such as water spraying systems to minimize the release of dust particles during demolition activities. This will help maintain better air quality ○ Implement noise reduction strategies, including the use of sound barriers, noise-dampening equipment, and scheduling noisy activities during specific times to minimize disruption to nearby residents. ○ Provide workers with personal protective equipment (PPE) such as masks and ear protection to mitigate health risks associated with dust inhalation and prolonged exposure to high noise levels ○ Conduct awareness programs for local residents, informing them about the demolition schedule, potential impacts, and measures being taken to mitigate dust and noise pollution. This foster understanding and cooperation ○ Establish a monitoring system to regularly assess air quality and noise levels. Implement a reporting mechanism to promptly address any deviations from acceptable standards, allowing for quick corrective actions ○ Explore and utilize demolition methods that generate less dust and noise, such as mechanical methods that are more controlled and produce fewer airborne particles.	Contractor/ MU-PIU / Consultant	10,000,000
OPERATIONAL AND MAINTANANCE PHASE				
SOCIAL IMPACTS				
1	Increase of admission of students to MU	○ Gender and disabled groups will be considered during the student's selection process ○ MU shall increase advertisement to attract more students to study the priority programmes for the Nation	MU	N/A Part of its project cost
2	Increase of revenue to MU	○ Innovate business activities linked with academic activities for enhancing income of the University ○ Implement robust financial management practices to ensure that the increased revenue is allocated efficiently and effectively.	MU	N/A

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Establish financial reserves for unforeseen circumstances and to secure the long-term financial stability of MU ○ Develop a comprehensive risk management plan to identify and mitigate potential risks that could impact the financial stability and success of MU ○ Implement a robust monitoring and evaluation system to track the outcomes and impacts of the new buildings and other initiatives ○ Develop and expand online education programs to reach a wider audience and attract students from different geographic locations.		
3	Job creation	○ Implement skill development programs and training initiatives to enhance the employability of local residents. This could include vocational training in areas relevant to the institution's operations, such as hospitality, agriculture, and business management ○ Prioritize the hiring of local residents for various positions within the institution. This can be facilitated through collaboration with local employment agencies or community outreach programs to connect potential employees with job opportunities ○ Foster partnerships with local businesses in the cleanliness, stationery, catering, and commercial sectors to ensure a mutually beneficial relationship. This can stimulate economic growth in the community and create additional job opportunities ○ Establish initiatives or support existing programs that promote entrepreneurship within the community. This could involve providing mentorship, or resources to aspiring entrepreneurs, thereby creating new businesses and job opportunities ○ Engage with the local community through regular communication channels to inform them about job opportunities, skill development programs, and other initiatives. Educate the community on the long-term benefits of the institution and how they can actively participate in and benefit from its operations.	MU	N/A
4	Government Revenue	○ The project will allocate a portion of its generated revenue to various governmental regulatory authorities such as the NEMC, MORUWASA,	MU	N/A

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
	Collection and economic growth	TANESCO, FIRE and Rescue Force, and OSHA. This financial support will enable these authorities to carry out their functions effectively and contribute to overall regional development. o Local authorities should identify the new sources of revenue in the area. o Strengthening revenue collection mechanisms. o Awareness creation for the people in the area on the importance of paying revenues.		
5	Growth of Trade and Increased Investment	o Sensitize the community to invest to accommodate business opportunities inclined by the increasing students' enrolment.	MU	N/A
6	Production of skilled labor force for implementing various development policies, plans and goals for sustainable social and economic growth of the Nation	o The project aims to boost student enrollment, indicating a proactive approach to meet the growing demand for skilled professionals in alignment with national development policies. o MU is committed to providing high-quality education to its students, ensuring that graduates possess the necessary skills and knowledge to contribute effectively to the nation's development goals o The project emphasizes aligning its curriculum and training programs with the priorities outlined in national development policies. This ensures that graduates are well-prepared to address the specific needs and challenges of the country. o MU recognizes its crucial role in supporting Tanzania's industrialization efforts. By tailoring its educational programs to meet the demands of the labor market, the institution directly contributes to the development of a skilled workforce that can drive economic growth in the industrial sector	MU	N/A
7	The growth of Banking activities in the project area	o The project anticipates a surge in Banking institutions establishing offices in the area. This growth is attributed to the overall expansion of Banking activities driven by factors such as population growth, increased investments, and heightened trading activities	MU	N/A

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Factors like the rise in student enrollment at MU, the creation of employment opportunities, and increased income for residents and workers are expected to contribute to the circulation of funds in the local economy. This, in turn, makes the area more attractive for additional Banking institutions. ○ The expectation is that both skilled and unskilled employees at MU will receive their payments through the Banking system. This integration of the payment system is likely to further incentivize Banks to operate in the area.		
SOCIAL IMPACTS				
8	Increased incidences of diseases and ill health	○ Implement proactive health interventions during and after the project to address the specific health concerns of the local communities. This may include vaccination programs, health education, and access to healthcare services. ○ A safety, health and environment induction course shall be conducted to all students and workers, putting more emphasis on HIV/AIDS, which has become a national disaster as well as other emerging pandemics such as COVID 19 and dengue fever. ○ The proponent shall conduct medical examinations for their workers annually. ○ The project shall include information education and communication component (IEC) in its budget. This will help to raise more awareness on HIV/AIDS, and means to suppress its incidence. ○ Introduce preventive measures to reduce the likelihood of disease transmission. This could involve promoting hygiene practices, ensuring clean water and sanitation facilities, and establishing protocols for waste disposal to minimize environmental health risks. ○ Engage with local communities to raise awareness about the importance of health and hygiene. Encourage community participation in health programs and empower them to take ownership of their well-being. ○ Establish a robust system for monitoring and surveillance of health conditions in the affected areas. This includes early detection of potential outbreaks, tracking disease trends, and implementing timely responses.	MU	35,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		o Collaborate with local health authorities and organizations to leverage their expertise and resources. This partnership can enhance the effectiveness of health interventions and ensure a coordinated response to health challenges. o Develop and implement emergency response plans to handle any sudden increases in disease incidences. This includes having protocols in place for rapid deployment of medical teams and resources in the event of an outbreak.		
9	Increased pressure on social services and utilities	o Use of water conservatively by instituting technologies (e.g., self-lock water taps) and awareness raising notices to users, etc.; o Establishment of water reservoir tanks and introducing rainwater harvest system; o Investing in training and capacity building programs for local service providers to enhance their ability to cope with increased demand. This could involve training healthcare professionals, utility workers, and other service providers to efficiently manage the rising needs of the community. o Conducting outreach programs to involve the local community in the planning and implementation process. This engagement helps in identifying specific needs and concerns of the community, ensuring that the development initiatives are culturally sensitive and well-received. o Implementing employment generation programs that focus on local hiring. By prioritizing the employment of local residents, the impact on housing, transportation, and other services can be mitigated, reducing the strain on social services. o Implementing measures to optimize the use of resources, such as energy-efficient technologies and water conservation practices. This can contribute to reducing the overall demand on utilities, making them more sustainable in the face of increased pressure. o Establishing strong partnerships with local government authorities to jointly plan and implement infrastructure projects. This collaboration ensures that the	MU	10,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		development aligns with the overall growth strategy of the area and leverages available resources efficiently. Extraction of underground water resources;		
10	Incidence of Gender Based Violence	○ Plan that ensures project awareness raising strategy (for workers and community members), a list of GBV service Providers to which GBV survivors will be referred, revisions to the GRM to ensure it can address GBV complaints, and information on GBV allegation procedures in the workplace. ○ Implement comprehensive awareness programs within Changarawe, Vikenge and Tangeni village to educate residents about the importance of gender equality, consent, and the prevention of GBV. ○ Promote community dialogues to address cultural norms contributing to GBV and encourage positive behavioral changes ○ Establish and enforce clear institutional policies at MU-Main campus to prevent and address GBV among students and staff. ○ Provide support services such as counseling and helplines within MU-Main campus to assist those affected by GBV. ○ Conduct training sessions for MU students and staff on recognizing and responding to signs of GBV. ○ Equip community leaders and relevant stakeholders with the skills to identify and address GBV issues effectively. ○ Create safe spaces within MU and the surrounding community where individuals can seek refuge and support. ○ Implement security measures to enhance the safety of students and residents, particularly during vulnerable times. ○ Establish a robust monitoring and evaluation system to track the effectiveness of interventions in reducing GBV. ○ Regularly assess the incidence of GBV and adjust strategies accordingly to address emerging challenges.	MU	15,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Collaborate with local authorities and law enforcement to ensure a swift response to reported cases of GBV. Also, foster partnerships with local organizations working on GBV prevention to leverage resources and expertise ○ Empower students with the knowledge and skills to advocate against GBV and contribute to a safer community. ○ Support community-led initiatives that empower individuals, especially women, to challenge and overcome GBV		
11	Disruption of traffic flow	○ Develop a comprehensive traffic management plan that considers the anticipated increase in vehicular and non-motorized traffic during the operational phase. This plan should outline specific measures to mitigate congestion and enhance safety in the surrounding areas. ○ Strategically place additional signboards to guide and inform road users about the changes in traffic patterns, entrances, and other relevant information. Clear signage can help prevent confusion and improve overall traffic flow. ○ Implement coordinated traffic control measures to optimize the flow of vehicles and ensure smooth operation near university entrances. This may involve the deployment of traffic personnel during peak hours or special events to manage the increased traffic. ○ Launch a public awareness campaign to inform the community, including students, faculty, and local residents, about the expected changes in traffic conditions. This could include distributing informational materials, organizing workshops, and using digital platforms to educate the public. ○ Explore the use of technology, such as smart traffic lights or traffic monitoring systems, to enhance traffic flow efficiency. These solutions can be integrated with the existing infrastructure to dynamically manage traffic based on real-time conditions. ○ Establish a feedback mechanism for the community to report any issues related to traffic disruption. This allows for continuous monitoring and adjustment of the traffic management plan based on feedback from the users.	MU	10,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
12	Health and safety risks due to fire hazards	o Adequate number of portable fire extinguishers shall be placed at strategic locations. o Regular fire and other disaster drills and awareness training shall be conducted. o Fire detectors and sprinkler systems shall be installed in the buildings. o The proponent shall insure buildings against fire Hazards. o Workers will be sensitized on appropriate fire prevention measures o Good housekeeping shall be maintained at all sites to reduce the fire risk. o The design of the buildings shall strictly adhere to the Fire Safety Standards.	MU	10,000,000
13	Increased level of crimes	o Increase the presence of law enforcement and security personnel in the affected areas. o Implement advanced surveillance systems and technologies to monitor and respond to criminal activities. o Establish community policing programs to foster collaboration between law enforcement and local residents. o Develop and implement community outreach programs to raise awareness about crime prevention strategies. o Encourage community members to actively participate in crime prevention through neighborhood watch programs. o Conduct regular awareness campaigns to educate residents about the potential risks and how to protect themselves o Strengthen partnerships with local government agencies, community leaders, and NGOs to create a coordinated response to crime. And establish communication channels for sharing information and coordinating efforts to address security concerns. o Introduce social programs and initiatives aimed at addressing the root causes of crime, such as unemployment, poverty, and lack of educational opportunities. o Support community development projects that contribute to a positive and inclusive social environment	MU	20,000,000
ENVIRONMENTAL IMPACTS				

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
14	Increased water pollution	o Wastewater will be discharged directly to the existing WSP at the campus. Also, WSP will be established inline with this project to manage all wastewater generated at MU-Main campus due to increase of population during operation phase. o Implement advanced treatment technologies to ensure that wastewater, especially from laboratories, undergoes proper treatment before being released into WSP. o Implement strict compliance measures to ensure that the hazardous liquid waste meets acceptable environmental standards before disposal o Conduct educational programs within MU-Main campus to raise awareness among staff, service provider and students about the potential environmental impact of improper wastewater disposal. o Promote responsible laboratory practices and waste management to reduce the generation of hazardous liquid waste o Collaborate with local communities in Mzumbe ward to create awareness about the environmental consequences of water pollution. And involve community members in monitoring activities and reporting any observed anomalies in water quality o Develop and implement emergency response plans to address any accidental spills or releases of hazardous substances into the wastewater system.	MU	8,000,000
15	Impact from poor hygienic condition	o Provision of adequate toilets for students and workers. o Sensitisation of workers on understanding of potential health and safety issues related to poor hygienic condition. o Construction of WSP for disposal of liquid wastes. o Regular Inspection and maintenance of the waste water system network o Improve dust suppression mechanisms within the MU premise	MU	5,000,000
16	Generation of solid and	o Provision of dust bins or rubbish pits for the wastes produced. o Ensure that the scrap metals and other hazardous wastes are well managed stored and dispersed off via licensed scrap metal dealers.	MU	10,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
	hazardous wastes	o Prohibit open burning since will increase pollutant gases to the atmosphere. o Implement a comprehensive waste segregation system to categorize different types of waste materials. o Establish recycling facilities or system to process recyclable materials such as paper, cardboard, plastics, and metals. o Implement a waste segregation system that separates waste into different categories such as recyclables (paper, plastic, glass, metal), organic waste (food scraps, yard waste), and non-recyclables. Provide clearly labeled bins for each category in easily accessible areas. o Conduct awareness campaigns and workshops to educate students, faculty, and staff about the importance of waste management, proper segregation, and the benefits of recycling and composting. o Establish a composting system for organic waste generated in cafeterias areas. The compost produced can be used for landscaping and gardening projects on campus. o Implement a system for collecting and properly disposing of electronic waste (e-waste) such as old computers, printers, and other electronic devices. o Provide training for staff on safe handling and storage of hazardous materials to reduce the risk of accidents and spills. o Implement secure storage facilities with appropriate containment measures to prevent leaks or contamination o Regularly monitor waste generation, segregation, and disposal practices on campus.		
17	Generation of Liquid waste	o Ensure that the wastewater is propery treated through WSP before being discharged into the open environment. o Develop and implement comprehensive waste management plans specifically targeting liquid waste generated. This includes proper disposal methods, recycling initiatives, and the use of environmentally friendly practices.	MU	10,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Optimize sanitation systems to minimize liquid waste production. This may involve the installation of water-efficient fixtures, regular maintenance to address leaks, and the use of technologies that reduce water usage in sanitation facilities. ○ Implement strategies to control and manage rainwater runoff to prevent contamination. This could involve the installation of permeable surfaces, green infrastructure, and drainage systems designed to capture and treat runoff before it enters water bodies. ○ Promote water-efficient practices in laboratories to reduce water consumption. This may include the use of advanced equipment that minimizes water usage, recycling systems for laboratory water, and the adoption of best practices in water conservation. ○ Establish monitoring programs to regularly assess liquid waste generation and ensure compliance with environmental regulations. This involves conducting regular inspections, implementing corrective actions when necessary, and maintaining records to track the effectiveness of mitigation measures ○ Conduct training programs for staff involved in construction and operation to raise awareness about the importance of liquid waste management. Promote a culture of environmental responsibility and provide guidelines for responsible waste disposal. ○ Develop and implement emergency response plans to address unforeseen spills or incidents related to liquid waste. This includes having the necessary equipment and trained personnel to respond promptly to minimize the impact on the environment.		
DECOMMISIONING PHASE				
SOCIAL IMPACTS				
1	Loss of employment	○ Seminars shall be conducted on alternative means of livelihood after termination of job.	MU	N/A

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
	and business opportunities	○ Implement comprehensive employment transition programs for affected workers, including skill development and retraining initiatives to enhance their employability in alternative sectors. ○ Establish a support mechanism for local businesses affected by the decommissioning, providing training, and resources to adapt to new market conditions ○ Conduct regular and transparent communication with stakeholders, including affected communities, to keep them informed about the decommissioning process, potential impacts, and mitigation measures. ○ Work closely with local government authorities to identify and implement measures to offset the negative impact on the affected persons, such as creating alternative employment opportunities or initiating community development projects		
2	Loss of revenue to institutions and the government	○ Explore alternative revenue streams to compensate for the loss incurred from the discontinued project. ○ Identify and develop new projects or initiatives that can generate income for both institutions and the government ○ Implement economic development programs in Changarawe, Vikenge and Tangeni village ward to stimulate local economic opportunities. ○ Encourage entrepreneurship and job creation to offset the negative economic impact on residents. ○ Engage with the affected communities to understand their needs and concerns. ○ Implement social support programs or initiatives to assist individuals and businesses impacted by the loss of economic opportunities	MU	N/A
NEGATIVE ENVIRONMENTAL IMPACTS				
3	Loss of aesthetic value due to	○ Formulate a comprehensive waste management plan specifically tailored for the decommissioning phase. And, clearly outline procedures for the segregation, collection, transportation, and disposal of demolished waste.	MU	N/A

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
	haphazard disposal of demolished waste	o Implement demolition techniques that minimize the generation of waste and reduce environmental impact. o Opt for methods that allow for the salvage and reuse of materials, thereby decreasing the amount of waste generated. o Conduct a thorough site characterization and assessment to identify potential environmental sensitivities and vulnerabilities. This will aid in determining appropriate disposal methods and areas, preventing contamination of soil and water bodies. o Identify and designate specific areas for waste disposal, ensuring they are environmentally suitable and comply with regulations. o Implement measures to prevent leachate from entering soil and water bodies. o Establish a monitoring and inspection program to assess the effectiveness of waste disposal measures. o Regularly inspect the disposal areas to identify and address any issues promptly. o Engage with the local community to raise awareness about the importance of proper waste disposal during decommissioning. Also, encourage community participation in waste management initiatives		
4	Dust and noise pollution from demolishing works	o Restrict demolition activities to specific time periods during the day when noise impact is likely to be less disruptive, such as during normal working hours. This can help minimize the disturbance to both site workers and residents o Inform and engage with residents and workers in the surrounding areas about the timing and nature of the demolition work. Providing regular updates and addressing concerns can contribute to better community understanding and cooperation. o Implement a comprehensive air quality monitoring system to track the emission of dust particles during demolition. This can help identify any exceedances of air quality standards and trigger immediate corrective actions.	Contractor/MU	15,000,000

S/N	Environmental & Social concerns	Mitigation/Management/ Enhancement measures	Responsible part	Estimated cost (TZS) Per Annum
		○ Dust suppression techniques, such as water spraying or misting systems, to control the release of dust particles into the air. This can help mitigate the impact on air quality and reduce potential health hazards. ○ Provide site workers with appropriate PPE, such as masks or respirators, to minimize their exposure to airborne particulate matter and protect their health during the demolition activities. ○ Ensure strict adherence to local regulations and standards related to noise and air quality during demolition. This includes obtaining necessary permits and approvals, as well as complying with established limits for noise and air pollutant emissions		
5	Health hazards to workers from demolishing work	○ Contractor should prepare health and safety management plan ○ Personal protective equipment (PPE), e.g., helmets, boots, goggles, earplugs, gloves and others will be provided and their use enforced to all workers involved in demolishing of structures during closure. ○ Contractor shall have registered and qualified HSE personnel to ensure health and safety of workers within the project area. ○ All workers involved in the demolishing work will be provided with training on health and safety matters. ○ In case of injuries, a well-equipped first aid kit will be onsite and injured workers will be provided first aid service by a trained first aider ○ Hygienic conditions within the working areas will be maintained and enforced	Contractor/MU	20,000,000
Total cost of mitigation measure (TZS)				**317,000,000**

CHAPTER 8: ENVIRONMENTAL AND SOCIAL MONITORING PLAN

8.1 Introduction

Monitoring refers to the systematic collection of data through a series of repetitive measurements over a long period of time to provide information on characteristics and functioning of environmental and social variables in specific areas over time. There are four types of monitoring that are relevant to this ESIA.

- **Baseline monitoring**: the measurement of environmental parameters during a pre-project period and operation period to determine the nature and ranges of natural variations and where possible establish the process of change.
- **Impact/effect monitoring**: involves the measurement of parameters (performance indicators) during establishment, operation and decommissioning phase in order to detect and quantify environmental and social change, which may have occurred as a result of the project. This monitoring provides experience for future projects and lessons that can be used to improve implementation methods and techniques.
- **Compliance monitoring**: takes the form of periodic sampling and continuous measurement of relevant parameter levels for checking compliance with standards and thresholds – e.g., for waste discharge, air pollution.
- **Mitigation monitoring** aims to determine the suitability and effectiveness of mitigation programs designed to diminish or compensate for adverse effects of the project.

Among the key issues to be monitored will be: (i) the status of the biological conditions; (ii) status of the physical works; (iii) the technical and environmental problems encountered; (iii) proposed solutions to the problems encountered; and, (v) the effectiveness of environmental and social measures adopted.

To ensure that mitigation measures are properly done, monitoring is essential. Table 8.1 provides details of the attributes to be monitored, frequency, and institutional responsibility and estimated costs. These costs are only approximations and therefore indicative. Costs that are to be covered by the developer are to be included in the project cost.

8.2 Monitoring Frequency and reporting

Monitoring frequency is proposed for each critical parameter depending on the likelihood and level of change over time. Some parameters take longer time to show changes while others would change in very short time. Ambient air levels of pollutant gases in and around the project should be measured annually. Air emissions should be monitored after the air pollution control device for particulate matter (or alternatively an opacity level of less than 10%). Frequent sampling for parameters should be undertaken during start-up and continue throughout the operation and demobilisation phase. Some monitoring may have to continue even beyond demobilisation for impacts such as effects of the wastewater discharged into the environment. Other parameters such as income, revenue, employment, changes in livelihoods, use of resources (water, energy) and

changes in norms and values will be monitored on annual basis, so as to allow for change to take place.

Monitoring data should be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions should be taken. Proponent is required to maintain records of air emission, effluents, hazardous waste sent off site as well as other parameters, fires, emergencies, accidents and ill health that may impact on the environment or workers. Records of monitoring results should be kept in an acceptable format and easily accessible, and information reviewed and evaluated to improve the effectiveness of the environmental protection.

8.3 Monitoring Plan

The proposed monitoring plan (Table 8.1) will be used by the proponent or the hired consultant for monitoring the proposed facilities during construction period and contains the following;

- The predicted impacts to be monitored as per schedule.
- Main parameters to be monitored.
- The sampling area.
- Where possible units or methods to be applied are indicated.
- The levels or target standards to be observed are also shown.
- The approximate costs. However, costs might change with the fluctuations of the shilling and cost escalations.

Table 8.1: Proposed Environmental and Social Monitoring Plan (ESMP) for mobilisation/planning phase, construction phase, demobilisation phase and operation phase

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
MOBILISATION PHASE							
Noise and dust generation	Noise levels	○ Continuous monitoring of noise levels and dust emissions at the construction site. ○ Periodic reporting and analysis of monitoring data will inform adjustments to the construction process to ensure compliance with environmental standards and regulations.	Monthly	Inspection, Visulisation and Measurement	In compliance with WB and TBS standards: • Daytime noise levels < 60 dB • Night-time noise levels < 50 dB	Contractor/ MU-PIU / Consultant	2,000,000
Increased Traffic and road accidents	Number of accidents or near miss	○ Regular monitoring of road infrastructure, traffic flow, and accident occurrences ○ Monitoring team will analyze data on traffic volume, road conditions, and incidents to identify trends and potential risks associated with the increased activity during the mobilisation phase. ○ Implementing traffic management plans, enhancing road safety measures, and conducting awareness campaigns, may be initiated based on the monitoring findings to minimize the impact of increased traffic and reduce the likelihood of road accidents.	Daily	Observation	No traffic/Accidents	Contractor/ MU-PIU / Consultant	2,000,000
Safety and health risks	Number and type of safety	○ Regular inspections of the construction site, equipment, and work practices to identify and mitigate potential hazards.	Weekly	Observation	Zero incidences/ accidence	Contractor/ MU-PIU / Consultant	2,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
	equipment such as mask, helmet gloves, safety boot and earplugs	○ Health monitoring of workers will be conducted to detect and manage any occupational health issues. ○ Emergency response plans will be reviewed and tested, and feedback from workers and the local community will be actively sought to enhance the overall safety performance.					
Generation of solid and liquid wastes	Solid and Liquid waste (Kg for Solid waste, Litres for Liquid waste)	○ Monitoring the types and quantities of solid and liquid waste generated during the mobilisation activities related to the establishment of the academic building, students' hostels, and cafeteria. ○ Assess compliance with waste disposal regulations and environmental standards, ensuring that proper waste handling procedures are followed to minimize adverse impacts on the surrounding environment and communities.	Monthly	Observation	Environmental compliance	Contractor/ MU-PIU / Consultant	2,000,000
CONSTRUCTION PHASE							
Conflicts and grievances	Number of meetings held during the mobilisation Phase and throughout the project Phases	○ Regular monitoring of community feedback, conducting stakeholder consultations, and maintaining open communication channels to promptly address and resolve any disputes.	Weekly	-Observation of records of complains -Analyse records of workers and community grievance	No complains	Contractor/ MU-PIU / Consultant	2,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
	-Number of complains and Incidences - Number and types of grievance reported and solved						
Impact on gender during employment	Number of men and women employed	o Ongoing data collection on the number of male and female workers employed, their job roles, and the wages they receive. o Assessing the working conditions to guarantee a safe and inclusive environment for all genders. o Periodic reviews should be conducted to identify any gender-specific challenges or issues that may arise during the construction activities	Monthly	Observation of records of complains	No Violations and harassments to vulnerable groups	Contractor/ MU-PIU / Consultant	3,000,000
Air pollution from noxious gasses	Measurement of ambient gaseous (Noxious gasses (CO, CO_2, NO, NO_X, SO_X))	o The continuous measurement and analysis of emissions from construction activities that may release noxious gases into the atmosphere. o Monitoring stations will be strategically placed to capture data on air pollutants, and real-time monitoring devices will be employed to track levels of harmful gases.	Quarterly	Measurement of ambient gaseous	TBS / WHO Guidelines • SO2< 0.5mg/m3 • CO < 10 - 30mg/m3 • NOx< 0.12-0.2	Contractor/ MU-PIU / Consultant	3,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
		○ Periodic site inspections and air quality assessments to ensure compliance with established environmental standards and regulations. ○ If elevated levels of noxious gases are detected, immediate corrective actions should be implemented to mitigate the impact, and adjustments to construction practices may be made to minimize air pollution. ○ Regular reporting and communication of monitoring results to relevant stakeholders will be integral to maintaining transparency and accountability throughout the construction phase			Conforming to EC directive 89/336/EEC and ISO 12103-1		
Air pollution from dust emission	Particulate matter (PM_{10} & $PM_{2.5}$)	○ The implementation of air quality monitoring stations strategically placed to measure particulate matter and dust concentrations. ○ Frequent inspections of dust control measures, such as water spraying and dust suppression systems, to ensure their effectiveness. ○ Real-time monitoring tools and periodic site visits will be employed to promptly identify any exceedances of acceptable dust levels through visual inspection. Also, the data collected shall inform timely corrective measures and adjustments to mitigate the impact of dust emissions on air quality, safeguarding both the environment and the well-being of the local community.	Quarterly	Measurement of particulate matter	TBS / WHO Standard (PM_{10}< 0.05-0.15 mg/m3 & $PM_{2.5}$<0.025-0.075 mg/m3)	Contractor/ MU-PIU / Consultant	3,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
Noise generation	Noise levels	○ The monitoring action for noise generation during the construction phase involves regular and systematic assessments of the decibel levels produced by construction activities. This includes; ○ The use of sound measuring devices positioned strategically across the construction site and its immediate surroundings. ○ Track variations in noise levels to ensure compliance with established environmental regulations and standards. ○ Identification and implementation of mitigation measures if noise levels exceed permissible limits.	Monthly	Inspection	In compliance with WB and TBS standards: • Daytime noise levels < 60 dB • Night-time noise levels < 50 dB	Contractor/ MU-PIU / Consultant	2,000,000
Solid and liquid waste generation	Solid and Liquid waste (Kg for Solid waste, Litres for Liquid waste)	○ The monitoring actions for solid and liquid waste generation during the construction phase of the proposed development involve regular and systematic checks to ensure compliance with environmental and social standards outlined in this ESIA report. This includes; ○ Continuous observation and documentation of waste disposal practices, both solid and liquid, to assess their impact on the surrounding environment. ○ Routine inspections, data collection on waste quantities and types, and verification of adherence to waste management protocols.	Weekly	Observation and M	Environmental compliance with The Environmental Management (Solid Waste Management) Regulation, 2009 as amended in 2016	Contractor/ MU-PIU / Consultant	3,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
		o Immediate corrective measures should be implemented if any deviations or non-compliance are identified, with ongoing reporting and communication to stakeholders to maintain transparency throughout the construction phase.					
Health and Safety risks	- Number and type of safety equipment such as mask, helmet gloves and earplugs	o Ongoing surveillance of construction activities to identify and mitigate potential hazards to both workers and the surrounding community. o Regular site inspections, safety audits, and the enforcement of safety protocols to ensure compliance with health and safety standards. o Emergency response plans should be in place, and incidents should be documented and analyzed for continuous improvement. o Community engagement should be implemented, with feedback mechanisms to address any health and safety concerns raised by local residents	Quarterly	Inspection; Voluntary testing;	Zero incidences/ accidence	Contractor/ MU-PIU / Consultant	10,000,000
Impact on natural resource (Energy and water)	Amount of water and energy consumed	o Monitoring the usage patterns, identifying potential sources of inefficiency or waste, and implementing measures to optimize resource utilization. o Track the project's adherence to sustainable practices, ensuring that energy is sourced efficiently, and water usage is minimized.	Monthly	Measurement / records / Observation	Efficient use of water	Contractor/ MU-PIU / Consultant	3,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
Increase in accident incidences	-Number of humps on the local road; -Number of warning signs erected; -Number of people using PPEs; -Number of people trained Presence of a first aid kit	o Implementing safety protocols, conducting regular safety audits, and maintaining incident reporting mechanisms. o Encompass on-site safety measures, adherence to construction standards, and the use of personal protective equipment. o Tracking accident statistics, analyzing root causes, and promptly addressing any emerging safety concerns. o Continuous communication and training programs for construction workers are essential to ensure awareness of safety practices	Quarterly	Inspection	Zero incidences/ accidence	Contractor/ MU-PIU / Consultant	4,000,000
DEMOBILISATION PHASE							
Loss of employment	Severance benefits	o Continuous air quality monitoring to detect any increase in dust levels. o Monitoring mechanisms may include the use of air quality monitoring stations strategically placed around the construction site. o Routine inspections, data collection, and analysis should be conducted to identify sources of dust emissions and assess the effectiveness of dust control measures. o Corrective actions to be taken if dust levels exceed permissible limits, ensuring that appropriate measures are promptly	Once upon Decommissioning	Inspection	N/A	Contractor/ MU-PIU / Consultant	N/A

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
		implemented to mitigate the impact on air quality and prevent harm to the environment and local communities					
Loss of business opportunities	Materials paid for	○ Regular assessments to quantify the number of individuals affected, identify the reasons for demobilization, and assess the socio-economic consequences on the local community. ○ Implementation of mitigation measures to address any adverse effects, ensuring a proactive and responsive approach to minimize the impact of employment loss during the demobilization phase. ○ Regular reporting and feedback mechanisms should be established to facilitate continuous improvement and adaptability in addressing emerging challenges related to employment dynamics	Once upon Decommissioning	Records	N/A	Contractor/ MU-PIU / Consultant	N/A
Poor waste management	Site clear of construction wastes and scrap metal	○ Assessing whether waste generated during the construction phase is appropriately collected, segregated, and disposed of in compliance with environmental regulations. ○ Monitoring teams should track waste management procedures to ensure that potential environmental and social impacts are minimized.	Once upon Decommissioning	Inspection	Environmental compliance	Contractor/ MU-PIU / Consultant	4,000,000
OPERATIONAL AND MAINTANANCE PHASE							

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
Creation of employment	-Number of local people employed -Number of women employed	○ Regularly assessing and documenting the number and types of jobs generated, ensuring compliance with agreed-upon employment targets, and evaluating the socio-economic impact on local communities. ○ Monitoring should extend to the maintenance of a diverse and inclusive workforce, with attention to gender equality and the involvement of local residents. The monitoring process will also track any potential adverse effects on employment conditions and community well-being, allowing for timely adjustments and interventions to maximize positive impacts and address any emerging issues	Annually	Records	N/A	MU	N/A
Community Health and Safety	-Inspection of the emergency and detection systems; - Verification of security system and access to the campus - Inspection of available	○ Regular inspections of infrastructure and facilities, health impact assessments, and continuous air and water quality monitoring. Emergency response drills and training sessions should be conducted to prepare for any unforeseen incidents. ○ Additionally, community feedback mechanisms and grievance redress processes should be established to address any health or safety concerns raised by the local population promptly.-	Quarterly	Measurement of ambient gaseous	Zero incidences/ accidence	MU	3,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
	health facility in the dispensary;						
Air pollution from dust emission	Measurement of particulate matter	o Monitoring the quantity and types of solid and liquid waste produced, tracking disposal methods, and ensuring compliance with environmental regulations. o Identify any deviations from the approved waste management strategies outlined in the ESIA report. o Continuous surveillance and periodic audits should be conducted to assess the effectiveness of waste management measures, mitigate potential environmental impacts, and promote sustainable practices throughout the project's lifecycle.	Quarterly	Measurement of particulate matter	TBS / WHO Standard (PM_{10}< 0.05-0.15 mg/m3 & $PM_{2.5}$<0.025-0.075 mg/m3)	MU	3,000,000
Solid and liquid waste generation	Solid and Liquid waste	o Monitoring the quantity and types of solid and liquid waste produced, tracking disposal methods, and ensuring compliance with environmental regulations. o Identify any deviations from the approved waste management strategies outlined in the ESIA report. o Continuous surveillance and periodic audits should be conducted to assess the effectiveness of waste management measures, mitigate potential environmental impacts, and	Weekly	Observation and Measurement	Environmental compliance with The Environmental Management (Solid Waste Management) Regulation, 2009 as amended in 2016	MU	3,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
		promote sustainable practices throughout the project's lifecycle.					
Health and Safety risks	- Number and type of safety equipment such as mask, helmet gloves and earplugs	o The monitoring action involves regular and systematic checks to ensure compliance with established health and safety protocols. This includes; o Ongoing assessment of workplace conditions, machinery safety, emergency response procedures, and the overall well-being of workers, students, and the local community. o Identify and address any potential health and safety risks promptly, fostering a secure and healthy environment throughout the project's operational lifecycle.	Quarterly	Inspection; Voluntary testing;	Zero incidences/ accidence	MU	3,000,000
Impact due to Fire hazard	-Records of authorized HSE; -Presence of fire alarm; -Presence of firefighting equipment and records of servicing; -Presence of fire hazard signs;	o Regular inspections of electrical systems, fire suppression equipment, and potential ignition sources. o Continuous monitoring of fire risks and readiness to address emergencies is crucial. o Training staff, students, and nearby communities on fire safety protocols and conducting regular drills would contribute to effective preparedness. o Maintaining communication channels with local emergency services and periodically reviewing and updating the Fire Prevention and Emergency Response Plan to ensure its relevance and efficiency in mitigating fire hazards.	Quarterly	Inspection	Fire and Rescue Force Regulations/ No fire hazards	MU	3,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
	- Presence of fire exit signs	○ Regular reporting and documentation of fire-related incidents, near misses, and corrective actions taken should be part of the monitoring system to enhance accountability and continual improvement.					
Increase in Energy Demand	-Availability and condition of solar panels; - Presence of energy conserving electric lamps	○ Regular monitoring of electricity and other energy sources used in the academic building, students' hostels, and cafeteria. ○ Ensure that the increased energy demand aligns with the projected estimates and complies with environmental standards. ○ Assessing the efficiency of energy use, identifying areas for potential optimization, and implementing measures to enhance energy sustainability	Quarterly	Inspection	Efficient use of Energy	MU	5,000,000
Increase in water demand	-Presence of water conserving taps; -Presence of gutters on roofs; -Presence of notices on water serving means;	○ Monitoring the water usage within the academic building, students' hostels, and cafeteria to ensure compliance with established standards and sustainable practices. ○ Assessing water extraction rates, usage efficiency, and the potential impact on local water sources. Additionally, monitoring should extend to the surrounding areas to identify any unintended consequences on the water supply for nearby communities.	Quarterly	Inspection and measurement	Efficient use of water	MU	5,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
Prevalence of Communicable diseases	Number of people who have undergone HIV/AIDS test/ Number of people tested by gender and Condoms distributed to end users	○ Ongoing surveillance of water quality, sanitation practices, and healthcare accessibility. ○ Regular health assessments of the local population, assessing the incidence of communicable diseases. ○ In case of any adverse trends, immediate corrective measures and interventions should be implemented, such as improving sanitation facilities, enhancing healthcare services, and conducting awareness campaigns. ○ Identify and address potential health risks, ensuring the well-being of the community and preventing the escalation of communicable diseases during the project's operational and maintenance phases	Annually	Observation of medical records	All workers reached with testing services and condoms	MU	4,000,000
Total							**74,000,000**

CHAPTER 9: COST BENEFIT ANALYSIS

9.1 Introduction

Cost Benefit Analysis (CBA) is the systematic process for calculating and comparing absolute costs and benefits of Business Resources. Costs and benefits are expressed in concrete monetary terms. The evaluation is often argumentative. However, CBA is a general method of project evaluation. This chapter describes the cost-benefit approach and estimation methods for the major costs and benefits of the proposed establishment. Cost benefit analysis estimates and compares the total benefits and costs of a project to the members of a specified community and project owner. CBA may be conducted at various geographical levels (international, national, state or regional). Critically, the principles and methods of CBA are the same at any spatial level. However, impacts that are transfers within one spatial level, such as the nation, may be benefits or costs at another spatial level, for example at regional level.

9.1.1 Relevance and challenges

Determining whether the proposed establishment is feasible in absolute terms benefits should outweigh the costs. The relevance and challenges of quantifying CBA lies within its relevance for business operations; help to compare and prioritize measures and identify the most suitable project if comparison has to be made. However, not all data/information necessary for the assessment is readily available to allow for an accurate and comprehensive assessment.

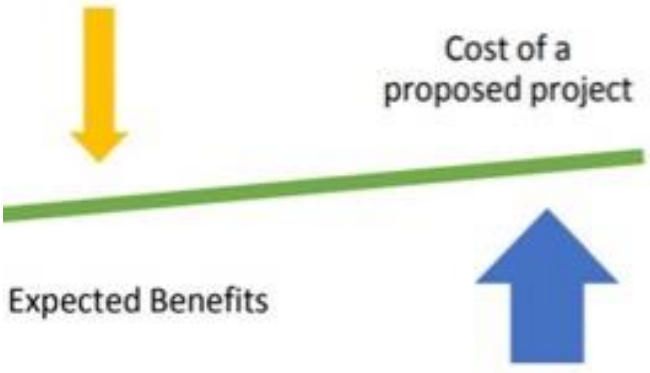


Figure 9.1: Cost and Benefit Analysis for CBA
(Source: Author works through Google)

This section aggregates the costs and benefits as well as describes the following:

a. Costs:

- Project investment
- Environment
- Socio-economic

b. Benefits:

- Income
- Environment

- Socio-economic

9.2 Estimated Environmental and Social cost related to the project

According to Chapters 8 and 9, the expected annual expenses for adopting enhancement measures, impact management, and monitoring processes are around TZS 391,000,000. The environmental costs could not be precisely calculated; hence they are not included in the anticipated expenditures for mitigation. The expenditures for these will also be short term because some of the affects won't be seen until the construction phase, especially if mitigation measures are fully adopted. Bills of Quantities contain comprehensive information on the construction expenses for each project.

9.2.1 Environmental cost

Analysis of environmental cost-benefit tradeoffs is evaluated in terms of both adverse and advantageous effects. The examination also takes into account whether the affects are reversible and whether the associated expenses are reasonable. The annual costs for monitoring and mitigating the indicated consequences are TZS. 74,000,000 and TZS. 317,000,000, respectively.

9.2.2 Community cost

The neighboring communities will bear the costs of the project's adverse environmental and social effects, such as noise pollution, deteriorated air quality, and safety and health hazards. But the use of mitigating strategies will lessen the expected effects. Other than the aforementioned, no other community events will be interfered with. MU is dedicated to reducing the detrimental effects on society and the environment.

9.2.3 Government cost

Through the Ministry of Education, Science and Technology (MoEST), the Government of the United Republic of Tanzania has obtained funding from the World Bank to support higher education as a driving force in the country's emerging economy. The project aims to revive the crucial areas for innovation, economic growth, and relevance to the labor market. Additionally, as was already noted, taxes collected during both project phases will help the government both directly and indirectly. In addition to increasing tax revenue, the investment will boost corporate development, industrialisation, and economic growth.

9.3 Benefits related to the proposed establishment

The proposed establishment at the university brings about direct and indirect benefits to the university, neighboring community, and the government. However, the primary benefits of the project can be further categorized as direct and indirect. While building construction projects may have some negative impacts, they are generally minimal compared to the positive benefits. Certain impacts resulting from the project cannot be precisely quantified and therefore cannot be included in benefit-cost analysis estimations. Overall, the benefits of the project are evident throughout all phases, including mobilisation, construction, operation, and decommissioning. These benefits

include employment opportunities, public benefits, revenue generation, and multiplier effects that create linkages with the local and national economy.

a) Direct Benefits

The project's implementation will result in numerous employment prospects, enhance the visual appeal, provide a favorable learning environment for students, generate entrepreneurial opportunities for the local community, and contribute to the growth of skilled workforce due to increased enrollment and the availability of conducive conditions for independent studying. Many of these intangible benefits directly benefit the stakeholders involved in the project.

b) Indirect Benefits

The proposed establishment brings about indirect advantages, primarily seen in the form of enhanced government revenue generated through various sectors such as TANESCO, RUWASA, TRA, etc. It also promotes cultural exchanges, infrastructure development, and economic growth. However, due to the project's reliance on inputs from different sectors, and these sectors relying on inputs themselves, there will be successive rounds of interactions among them, leading to additional output from each sector of the economy.

10.3.1 Benefits to MU

The proposed establishment will bring long-lasting benefits to MU throughout its lifespan. Completion of the project will serve as a catalyst for increased student enrollment, resulting in a potential annual monetary value growth. This will significantly enhance MU financial capacity and sustainability. Additionally, the improved financial standing will not only boost enrollment but also contribute to good governance and efficient university operations. The project will support MU in delivering high-quality education, conducting impactful research, and providing valuable public services. It will also contribute to the university's reputation and image, offering intangible benefits.

10.3.2 Benefits to the Local Community

The proposed establishment of new buildings infrastructures at MU aims to enhance the university's infrastructure and increase its capacity. This expansion is expected to generate a demand for various types of staff, including technical, administrative, and academic personnel. Throughout the construction and operational phases, the project will create additional employment opportunities for individuals residing near the MU, Main campus, particularly in roles related to operations and maintenance. Unskilled workers will benefit from daily wage opportunities, while the university's presence will foster business prospects in the surrounding area. These business opportunities align with the government's efforts to promote job creation for Tanzanians. Although specific salary details are yet to be determined, it is anticipated that employment will provide workers with income, improving their quality of life and potentially enhancing their lifestyles.

Furthermore, the benefits of employment and income will extend beyond the workers themselves, positively impacting their dependents and others in the community.

However, the availability of suitably qualified local individuals will determine the extent of employment opportunities and associated benefits. Therefore, capacity building initiatives are crucial to realize these benefits. Alongside capacity building, it will be necessary to establish policies that encourage real estate developers within the economic sector to hire local laborers with the necessary skills and experience. Additionally, the project is expected to bring about the following economic and social advantages:

- Increased economic activity in the local area.
- Enhanced infrastructure and services within the vicinity of the campus.
- Potential growth in related industries, such as hospitality, transportation, and retail.
- Improved access to education and research opportunities for the local community.
- Strengthened collaboration between the university and local stakeholders.
- Heightened prestige and reputation for MU as a leading educational institution.

9.3.3 Benefits to the Government

The project is expected to bring various benefits to the government. These advantages include cost savings for the government due to reduced financial reliance on MU. It is projected that the project's operational phase will enhance MU financial capacity and sustainability through generated earnings. As a result, the government will have the opportunity to allocate the saved budget share for other development plans. Additionally, the project will contribute to the realisation of National Policies such as Education Reforms by expanding student enrollment in different degree programs, thereby increasing MU financial capacity.

Furthermore, the government will benefit from an increased number of experts graduating from MU, particularly in priority disciplines across various fields. This will enable the government to utilize local experts in future projects instead of relying on foreign experts, tapping into internal resources.

9.4 Conclusion on Cost Benefits Analysis

The project's environmental and social costs are relatively low in value when compared to the benefits it will bring. The option of not proceeding with the project is rejected as it is necessary and desirable to have institutions that help in delivering high-quality education, conducting impactful research, and providing valuable public services. The project will directly promote investment in different businesses and services, as well as improve Tanzania's reputation as a preferred investment destination. These factors will create more employment opportunities for Tanzanians and contribute to poverty eradication efforts. Therefore, the implementation of the project will bring overall benefits to the country.

CHAPTER 10: DECOMMISSIONING PLAN

10.1 Preliminary Decommissioning Plan

The project is anticipated to last for several years based on buildings standards and regulation (Though the exact years for project lifespan will be stated after project design), and this document outlines an initial decommissioning plan. The plan aims to establish practical decommissioning approaches that can be executed safely, without endangering the public's health and safety, decommissioning personnel, or causing harm to the environment. It adheres to the guidelines and regulations set by relevant regulatory agencies. The purpose of this preliminary decommissioning plan is to ensure that the decommissioning and final disposition of the project though it's not expected to happen are taken into account during the project's initial design phase.

This preliminary plan will remain a dynamic document and undergo revisions throughout the operational life of the project. Regular reviews and updates will be conducted to incorporate any changes in facility construction or operation that may impact the decommissioning process.
The Contractor will be required to prepare a detailed Demolition Plan and Construction Management Plan to the satisfaction of the proponent and relevant Authorities prior to the commencement of works on site.

10.2 Objectives of the Plan

The initial plan aims to prioritize the inclusion of decommissioning as a crucial factor right from the beginning of the project, throughout the design phase, and during the operation phase. The plan serves the following objectives:

- The primary objective of the preliminary plan is to ensure that designers of the building and infrastructure are fully aware of decommissioning requirements during the initial project design. This means that if there are design options available for materials, system components, and component locations that can enhance decommissioning, those choices should be made.
- Another goal of the preliminary plan is to identify the potential decommissioning options and the final status of the facility. These options will be evaluated and narrowed down to the preferred decommissioning method as the end of the project lifespan approaches.
- The final purpose of the preliminary plan is to demonstrate to regulatory agencies that important considerations regarding decommissioning are taken into account as early as possible during the initial project design.
- Additionally, the plan serves as a starting point to showcase various aspects related to decommissioning, such as methods, costs, schedules, and the operational impact on the infrastructure facilities.
- The plan acts as the initial reference to show that aspects like decommissioning techniques, expenses, timelines, and operational effects on decommissioning will undergo continuous evaluation and improvement throughout the operational lifespan.

The plan will outline feasible decommissioning methods for the project, providing a general description. This description should demonstrate the practicality of the considered methods and their ability to ensure the health and safety of the public and decommissioning personnel. Design personnel should thoroughly examine the proposed decommissioning methods and take measures to incorporate design features that will facilitate the decommissioning process. Key considerations include:

- Estimating the required manpower, materials, and costs to support the decommissioning activities.
- Describing the intended final disposition and status of the plant and site after decommissioning.
- Discussing the commitment to allocate adequate financing for the decommissioning process.
- Identifying the necessary records to be maintained throughout the construction and operation phases that will aid in decommissioning, such as a complete set of "as built" drawings.

10.3 Preliminary Plan

10.3.1 Project Removal Methodology and Schedule

The proponent is responsible for financing and carrying out all aspects of project decommissioning, which includes engineering, environmental assessment, permitting, construction, and mitigation activities related to the removal of the building facilities, as outlined in this Plan. The Proponent must also address the environmental impacts during and after the project removal by promptly responding to defined events during the monitoring phase.

Furthermore, the university is obligated to safely remove the facilities and its accompanying structures in a manner that:

- Minimizes any adverse environmental effects.
- Meets the company's obligations under the Environmental Management Act (2004).
- Restores the site to a condition suitable for various uses.
- Pays all outstanding dues to workers, the government, suppliers, and other relevant parties.

The process of project removal will commence six months after closure and extend for a period of 2 years. During the initial six months following closure, the proponent will conduct an inventory of all components requiring removal or disposal. This inventory will encompass the identification of buildings and structures, to be demolished. Additionally, the method of disposal will be finalized. This information will be crucial for the development of the final decommissioning plan, which will then undergo approval by NEMC.

Upon approval of the decommissioning plan, the removal of metal parts will be prioritized within the first month to prevent any potential vandalism. Subsequently, in the second month of the decommissioning process, the focus will shift towards removing concrete structures and foundations. The resulting debris will be repurposed as fill material for rural roads.

10.3.2 Component to be demolished

The elements of the project that need to be demolished are typically built using load-bearing masonry walls along with roofs made of steel or timber frames, as well as metal roofs.

1. **Buildings and other infrastructure**
   - All construction elements, such as buildings, pillars, platforms, or ramps supporting machinery or equipment, will be dismantled and secured to ensure safety. The areas previously occupied by these structures will be restored and replanted with vegetation as necessary.
   - Equipment that is no longer functional will be sold through an auction process to scrap dealers.
   - The future utilisation of the water supply infrastructure (pipeline) will be determined in collaboration with the National and District Closure Committees. The project aims to transfer the pipeline infrastructure to the district for its ongoing use.

All disturbed areas will be landscaped and re-vegetated using indigenous trees.

10.3.3 Decommissioning Phase

Project decommissioning has five phases:

- Pre-removal monitoring;
- Permitting;
- Interim protective measures;
- Project removal and associated protective actions; and
- Post-removal activities, including monitoring of environment and socio-economic activities.

The initial three phases will occur before the Project is removed, specifically within the first six months. The fourth phase, which involves the removal of the project and necessary protective measures, will take place six months after project closure. The fifth phase will commence after complete removal of the project, and due to its medium scale and relatively moderate impacts, it will continue for at least two years.

The following description outlines the activities that will occur in each phase:

a. **Pre-removal monitoring:** This phase involves assessing the environmental and socio-economic conditions of the project and its surroundings. The purpose is to identify any environmental or social liabilities that need to be addressed before obtaining closure permits. Additionally, this period will include inventorying all assets and facilities that require disposal and preparing a final decommissioning plan for approval by the National Environment Management Council (NEMC).

b. **Permitting:** The proponent will acquire all necessary permits required for the project's removal. This includes permits from MoEST, TCU, NEMC, Local Government Authorities, and others as necessary.

c. **Interim Protective Actions:** This phase focuses on implementing any interim measures necessary to safeguard human health and the environment during the removal process.

d. **Project Removal:** As mentioned earlier, the project will be completely removed within a six-month timeframe.

e. **Post-Removal Activities:** Following the project's removal, monitoring activities will continue for a period of two years to assess any lingering impacts.

Detailed information regarding the decommissioning of the project and its associated impacts, as well as proposed measures to restore the site to its former state, are provided in Table 11.1. The estimated cost for the decommissioning plan is TZS 190,000,000, which is subject to change based on currency value and other economic factors at that time.

Table 10.1: Decommissioning and Closure Plan

Activity	Closure Plan	Responsibility	Estimated Budget
Take apart all the equipment and dismantle the structures.	o Take apart electrical devices such as air conditioners, generators, and other machinery. o Consult with TANESCO (Tanzania Electric Supply Company) to disconnect the power supply for the building project. o All concrete and metal structures, including offices, washrooms, and pavements, will be demolished. o Warning signs will be displayed, and a fence will be erected around all commercial buildings. o Qualified engineers will supervise all disassembling and demolition activities. o The Closure Committee will oversee and monitor all closure activities to ensure proper execution. o Technical assistance during the closure phase will be sought by consulting relevant stakeholders.	MU and Closure Committee	100,000,000
Personal Protective Equipment (PPE)	o During the closure phase, it is mandatory for all workers to wear suitable personal protective equipment (PPE) such as a helmet, safety boots, dust mask, safety gloves, goggles, protective garments, and a safety vest.	MU and Closure Committee	20,000,000
Waste Management	o During the closure phase, proper waste sorting will be implemented for efficient management. o A review process will be established to regularly update the waste management	MU and Closure Committee	20,000,000

	plan to adapt to changes in building plans, schedules, community standards, and recognized best practices. o Instead of being dumped on land, debris can be utilized to fill feeder roads, providing an alternative use. o Metal materials will be collected and transported to steel factories for recycling and subsequent metal production. o All hazardous wastes discovered during the decommissioning of the building will be cleaned up and disposed of in accordance with regulations. o The closure committee will ensure that no waste is disposed of in water bodies.		
Rehabilitation of project site	o A suitable re-vegetation plan will be executed to restore the site to its original condition. o Measures will be implemented during the vegetation period to control surface water runoff and prevent erosion. o Regular monitoring and inspection of the area will be carried out to identify any signs of erosion, and necessary actions will be taken to rectify any occurrences. o Fencing and signage will be installed to limit access and minimize disturbances in newly vegetated areas.	MU and Closure Committee	50,000,000

CHAPTER 11: CONCLUSION

In conclusion, the proposed establishment of the ICT Complex and Innovation Incubation Centre, Cafeteria, Academic Complex, Composting Facility, Reservoir Tanks, and the Rehabilitation of

the existing water supply system demonstrates MU commitment to holistic growth and development. These initiatives encompass various aspects of modernizing the campus infrastructure, fostering innovation, enhancing the learning environment, promoting sustainability, and ensuring adequate resources for the university community.

By embarking on these projects, MU is poised to elevate its status as a center of academic excellence and innovation. The diverse range of initiatives outlined in the proposal collectively contribute to creating a well-rounded and forward-looking institution that not only meets the current needs of its students and staff but also prepares them for the challenges of the future. Through these endeavors, MU is set to strengthen its position as a leading educational institution in the Morogoro region.

REFFERENCE

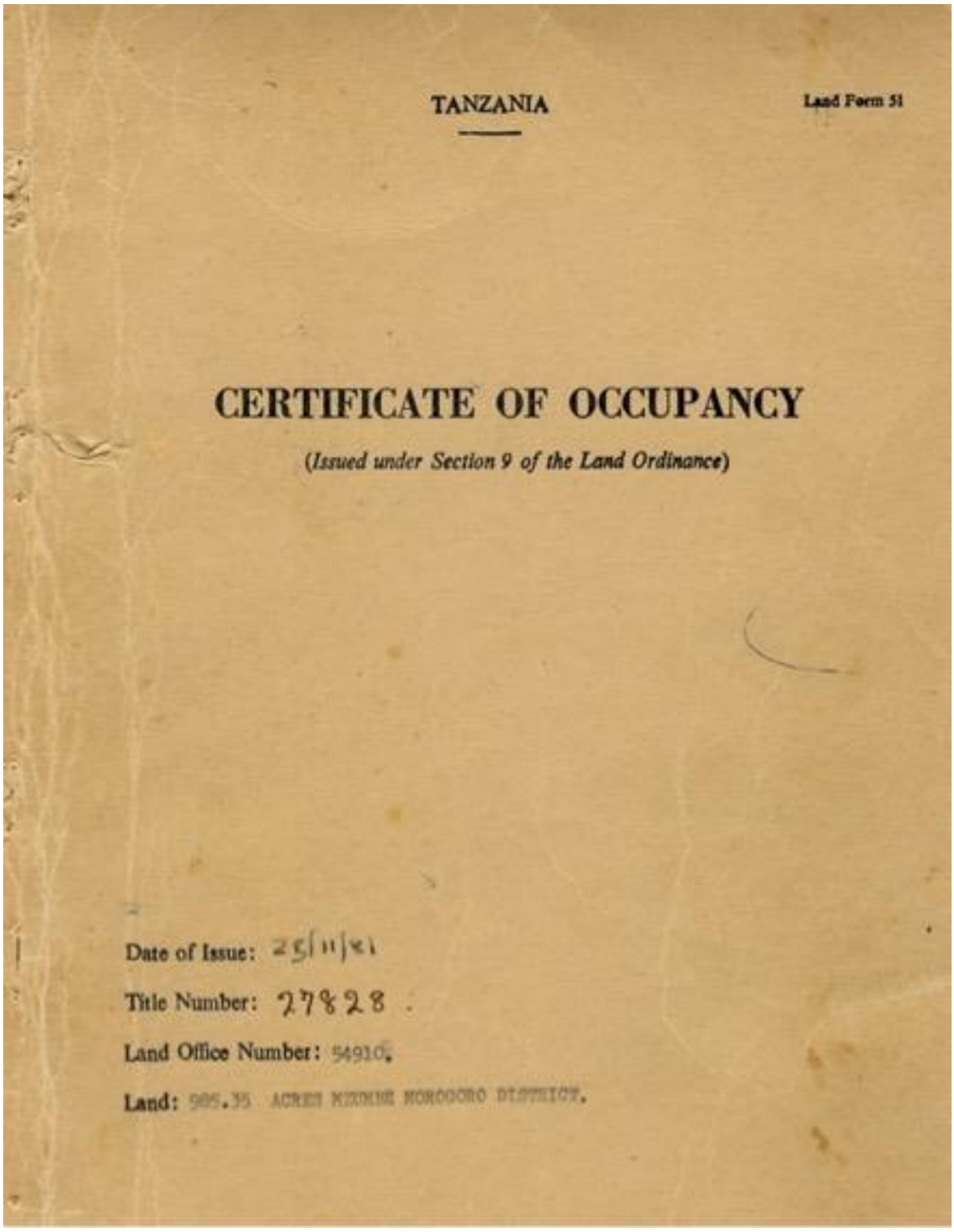
1. Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations 2018.

2. World Bank Environmental and Social Standards (ESS) for HEET as stipulated in the Environmental and Social Framework (ESF) and other guiding tools such as Environmental and Social Management Framework (ESMF), and stakeholder Engagement Plan (SEP).
3. World Bank, Project Operation Manual (POM) 2021.
4. World Bank, Project Appraisal Document (PAD) 2021.
5. Mzumbe University Master Plan, 2015 – 2035.
6. Strategic Plan for Mvomero District Council, 2015
7. Social Economic profile for Mvomero District Council, 2017
8. The Population and Housing Census (National Bureau of Statistics), 2022
9. The Tanzania Development Vision 2025 of 2000.
10. United Republic of Tanzania, 1992.Energy Policy (1992).
11. United Republic of Tanzania, 1995. Land Policy (1995).
12. United Republic of Tanzania, 1995. The Education (Amendment) Act, 1995
13. United Republic of Tanzania, 1997. National Environmental Policy (1997).
14. United Republic of Tanzania, 1997.The Contractors Registration Act (1997).
15. United Republic of Tanzania, 1997. The Architects and Quantity Surveyors Act (1997).
16. United Republic of Tanzania, 2000. The Tanzania Development Vision (2000).
17. United Republic of Tanzania, 2000.National Human Settlements Development Policy (2000).
18. United Republic of Tanzania, 2002. National Gender Policy (2002).
19. United Republic of Tanzania, 2003.Occupational Health and Safety (2003).
20. United Republic of Tanzania, 2003. Construction Industry Policy (2003).
21. United Republic of Tanzania, 2004. Employment and Labour Relations Act No. 6 (2004).
22. United Republic of Tanzania, 2004. Environmental Management Act No. 20 (2004), Cap. 191.
23. United Republic of Tanzania, 2005 Impact Assessment and Auditing Regulations (2005).
24. United Republic of Tanzania, 2005 Impact Assessment and Auditing Regulations (2005).
25. United Republic of Tanzania, 2007. Engineers Registration Act and its Amendments 1997, Dar es Salaam, Tanzania (2007)
26. United Republic of Tanzania, 2007. The Land Act, 1999 The Urban Planning Act (2007).
27. United Republic of Tanzania, 2007. Fire and Rescue Act (2007)
28. United Republic of Tanzania, 2007. The Urban Planning Act (2007).
29. United Republic of Tanzania, 2008. The Prevention and Control of HIV/AIDS Act (No. 28), 2008
30. United Republic of Tanzania, 2008. The Workers Compensation Act (No.20), 2008
31. United Republic of Tanzania, 2009. Public Health Act (2009).
32. United Republic of Tanzania, 2009. Water Supply and Sanitation Act No. 12 (2009).
33. United Republic of Tanzania, 2009. The Standard Act of 2009
34. United Republic of Tanzania, 2021. National Environmental Policy (2021).

35. World Health Organisation (WHO). Air Quality Guidelines Global Update, 2005. PM 24-hour value is the 99th percentile.

APPENDICES

Appendix 1: Certificate of Occupacy



TANZANIA

Land Form 51

CERTIFICATE OF OCCUPANCY

(Issued under Section 9 of the Land Ordinance)

Date of Issue: 25/11/81

Title Number: 27828

Land Office Number: 54910

Land: 985.35 ACRES MZUMBE MOROGORO DISTRICT.

THE LAND REGISTRATION ORDANCE (CAP.334)
APPLICATION FOR REGISTRATION OF A TRANSMISION
BY OPERATION OF LAW.
(SECTION 71)

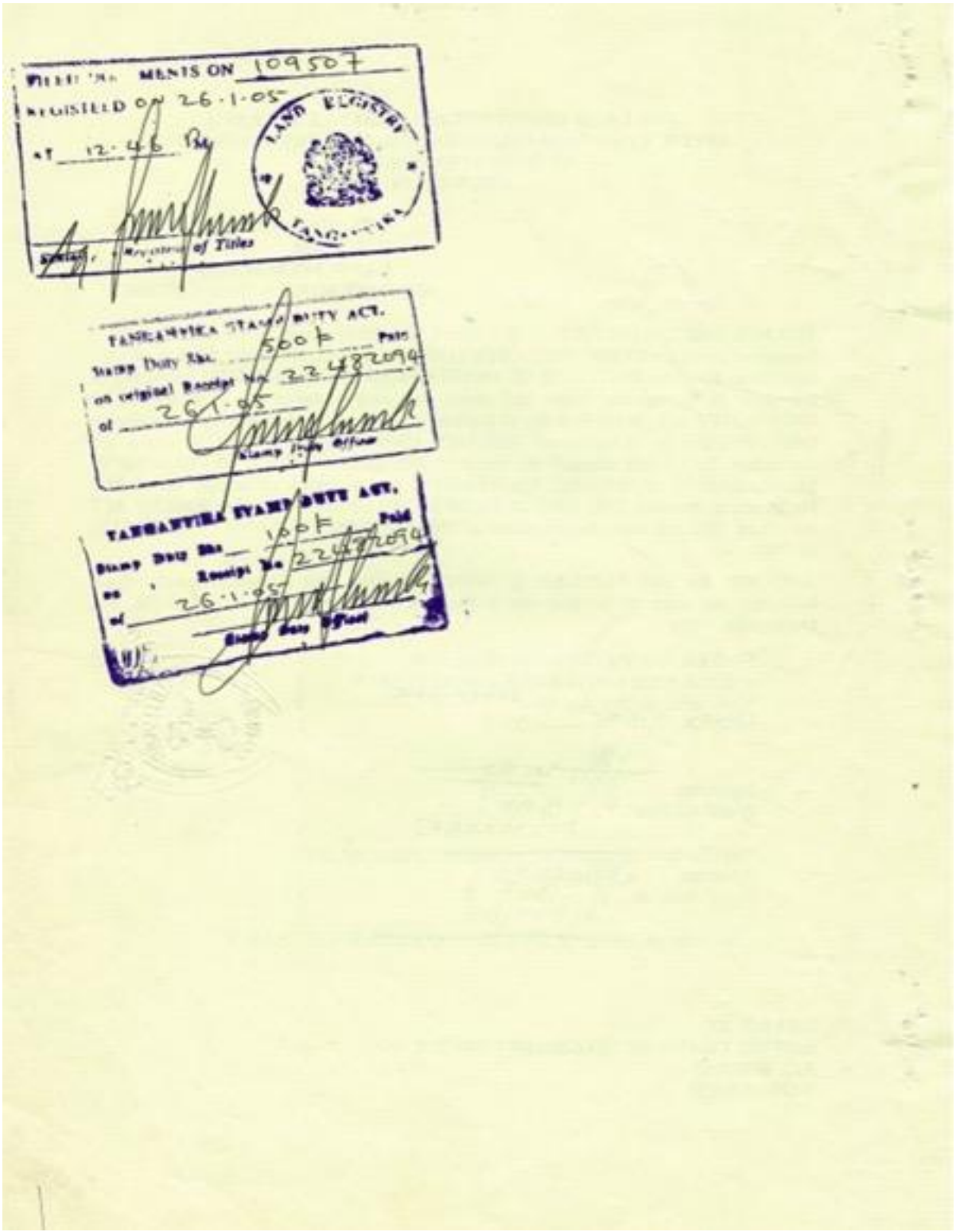
L. O. NO. 54910
C. T. 27828
LAND: 985.35ACRES
MZUMBE MOROGORO DISTRICT

THE MZUMBE UNIVERSITY, of P.O. Box 1 MZUMBE a body corporate Registered under the COMPANIES ORDINANCE (CAP 212, HEREBY APPLY to have the name of the INSTITUTE OF DEVELOPMENT MANAGEMENT appearing on the right of Occupancy under the above reference changed to THE MZUMBE UNIVERSITY as from the first day of December, 2001, and we, solemnly and sincerely DECLARE that by virtue of the MZUMBE UNIVERSITY ACT NO.21 dated 21st December, 2001 which changed the name of THE INSTITUTE OF DEVELOPMENT MANAGEMENT to MZUMBE UNIVERSITY, and provision of section 68 of ACT No.21 which repealed THE INSTITUTE OF DEVELOPMENT MANAGEMENT ACT No. 15 of 1972 and cause Incorporation of THE MZUMBE UNIVERSITY ACT NO.21 of 2001.

AND WE, the said MZUMBE UNIVERSITY make this declaration consciensily believing the same to be true and accordance with provisions of the Oaths Act, Declaration 1966.

SEALED with the COMMON SEAL of the)
said MZUMBE UNIVERSITY and DELIVERED)
in our presence this day of DECEMBER)
THIRTY FIRST 2004)
)
)
Signature .....)
Postal Address P.O.BOX 1)
MZUMBE)
Qualification ~~CHAIRMAN/CHANCELLOR~~/VICE CHANCELLOR)
Signature .....)
Postal Address P.O.BOX 1)
MZUMBE)
Qualification ~~DEPUTY VICE CHANCELLOR~~/REGISTRAR)

DRAWN BY:
DISTRICT LAND DEVELOPMENT OFFICE
P.O. BOX 853
MOROGORO.


MENTS ON 109507
REGISTERED ON 26-1-95
AT 12:46 PM
LAND REGISTRY
TANGANYIKA
Registrar of Titles
TANGANYIKA STAMP DUTY ACT.
Stamp Duty Rs. 500/=
on original Receipt No 32482094
of 26-1-95
Stamp Duty Officer
TANGANYIKA STAMP DUTY ACT.
Stamp Duty Rs. 100/=
Receipt No 22482094
on 26-1-95
of
Stamp Duty Officer

TITLE No. 27828

24 Land Form 32.

TANZANIA STAMP DUTY ACT

20/=

L.O.NO.84910. 668053

28-6-80

MG/L.D.NO/30.

THE UNITED REPUBLIC OF TANZANIA

CERTIFICATE OF OCCUPANCY

(Section 9 of the Land Ordinance)

The 25th day of November One thousand nine hundred and eighty one

TITLE NO. 27828

THIS IS TO CERTIFY that THE INSTITUTE OF DEVELOPMENT MANAGEMENT MZUMBE a body Corporate established under the Institute of Development Management Act No.15 of 1972 of P.O.BOX 1 MZUMBE MOROGORO.----------

(hereinafter called "the Occupier") is entitled to a Right of Occupancy (hereinafter called "the Right") in and over the Land described in the Schedule hereto (hereinafter called "the Land") term of ninety nine years from the first day of July, One thousand nine hundred and eighty according to the true intent and meaning of the Land Ordinance and subject to the provisions thereof and to any regulations made thereunder and to any enactment in substitution therefor or amendment thereof and to the following special conditions:-

1. The Occupier having paid rent up to the thirtieth day of June, 1981, shall thereafter pay rent of shillings fourteen thousand five hundred eighty (Shs.14,580/=) a year in advance on the first day of July in every year of the term without any deduction PROVIDED that the rent may be revised by the Minister for the time being responsible for Lands (hereinafter called "the Minister") on the first day of July in each of the years 1990, 2000, 2010, 2020, 2030, 2040, 2050, 2060 and 2070 or within three years thereafter in each case.

2. The Occupier shall:-

(i) Maintain on the land buildings (hereinafter called "the buildings") in permanent materials designed for use in accordance with the conditions of the Right and which conform to the building line (if any) decided by the Morogoro District Development Council (hereinafter called "the Authority");

.....2/.....

TANZANIA STAMP DUTY ACT

370/=

668053

(ii) At all times during the term of the Right have on the land buildings as approved by the Authority and maintain them in good order and repair to the satisfaction of the Director of Land Development Services (hereinafter called "the Director");

(iii) Not erect or commence to erect on the land any building except in accordance with building plans and specifications which shall have been first approved by the Authority as hereinbefore provided;

(iv) Be responsible for the protection of all beacons on the land throughout the term of the Right. Missing beacons will have to be re-established at any time at the Occupier's expenses as assessed by the Director for Surveys and Mapping.

Approval of plans of any building by the Authority shall not imply that the construction of such a building will satisfy the Occupier's obligation under the conditions of the Right and shall not imply waiver or modification of any condition in the Right.

3. (i) The Occupier shall not subdivide the land or assign, sublet or otherwise dispose of or deal with the whole or any part of it or of any building on it without the previous written consent of the Director.

(ii) Occupation or use of the whole or any part of the land or buildings on it by any person other than the Occupier or her employees agents contractors or members of the household shall be deemed a dealing with land or buildings.

4. Except as hereinbefore provided the Director shall have an absolute discretion to give or withhold consent under condition 3 (i). Any dealing or agreement (other than a mortgage or charge) entered into before compliance with conditions 2 (iv) will not receive consent except in special circumstances of which the Director shall be the sole judge.

..../3/....

-3-

5. The Occupier shall pay to the Minister on demand made by the Director on his behalf:-

(i) any further fees or stamp duties which may discovered to be payable by the Occupier in connection with the Right;

(ii) an amount equal to any contribution in lieu of rates which may be payable by Government for the land during the term of the Right;

(iii) such sum as the Director shall assess as a proper share payable for the land of the cost of making up the road or improvement of same upon which the land fronts, abuts or adjoins, whether such demand is made before during or after such making or improvement thereof. This condition does not oblige the Government to make or improve roads.

6. The land shall be used solely for EDUCATIONAL purposes and for other purposes ancillary thereto.

7. The President may revoke the Right for good cause and in public interest.

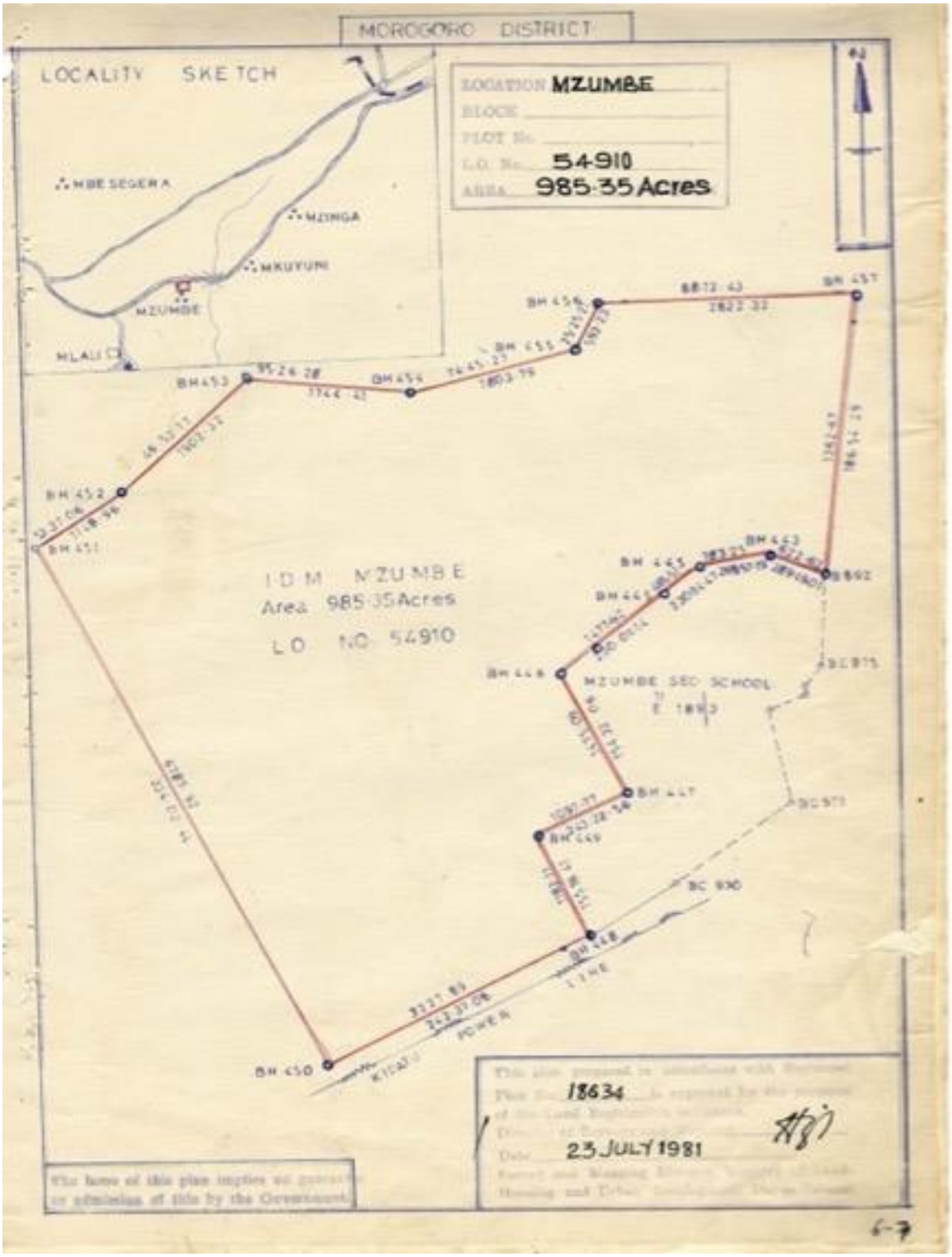
SCHEDULE

ALL that piece or parcel of land situate at Mzumbe Morogoro District having an area of nine hundred eighty five decimal point three five (985.35) acres, shown for identification only edged red on the registered surveys plan numbered 18634 deposited at the Office of the Director for Surveys and Mapping at Dar es Salaam.

GIVEN under my hand and seal and by Order of the Minister the day and year first above written.

DIRECTOR
LAND DEVELOPMENT SERVICES

DIRECTOR OF LAND DEVELOPMENT SERVICES


MOROGORO DISTRICT
LOCALITY SKETCH
LOCATION MZUMBE
BLOCK
PLOT No.
L.O. No. 54910
AREA 985·35 Acres
MBE SEGERA
MZINGA
MKUYUNI
MZUMBE
MLALI
I.D.M. MZUMBE
Area 985·35Acres
L.O. No. 54910
MZUMBE SEC. SCHOOL
BH 450
BH 451
BH 452
BH 453
BH 454
BH 455
BH 456
BH 457
BH 446
BH 447
BH 448
BH 449
BC 930
18634
23 JULY 1981

- 4 -

We, the within-named INSTITUTE OF DEVELOPMENT MANAGEMENT MZUMBE hereby accept the terms and conditions contained in the foregoing Certificate of Occupancy.

SEALED with the COMMON SEAL of the said INSTITUTE OF DEVELOPMENT MANAGEMENT MZUMBE and DELIVERED in our presence this 9th January day of 1992.

Signature: .....

Postal Address: IDM P.O. Box 1 Mzumbe

Qualification: Director IDM Board of Governors

Signature: .....

Postal Address: P.O. Box 1 Mzumbe

Qualification: Director IDM Board of Governors

LAND [illegible] DAR ES SALAAM

CHANGE OF NAME

Filed Document No. 109507

Date of Entry 26-1-05 Time 12:46 P.m.

To THE MZUMBE UNIVERSITY of P.O. BOX 1, MZUMBE (By virtue of the MZUMBE UNIVERSITY ACT No. 21 OF 2001.

A.G. for Principal Officer of Titles

NOTE

[illegible]

Appendix 2: Ambient Gases Measured at Onsite and Offsite

Code & Coordinate	Location	O_2	O_3	CO_2	CO	NO	SO_2	H_2S	CH4
		%	%	%	mg/m^3	mg/m^3	mg/m^3	%	%
AQMS1 (-6.930008& 37.55675)	ICT Complex	20.9	0.00	0.03	0.00	0.00	0.00	0.00	0.00
AQMS2 (-6.936051& 37.557616)	Cafeteria	20.9	0.00	0.03	0.00	0.00	0.00	0.00	0.00
AQMS3 (-6.93141 & 37.557750)	Academic Complex	20.9	0.00	0.03	0.00	0.00	0.00	0.00	0.00
AQMS4 (-6.923993 & 37.556515)	Composting facility	20.9	0.00	0.02	0.00	0.00	0.00	0.00	0.00
AQMS5 (-6.936589 & 37.570977)	Reservoir tanks	20.9	0.00	0.02	0.00	0.00	0.00	0.00	0.00
AQMS6 (-6.913581 & 37.564768)	Residential area	20.9	0.00	0.05	0.00	0.00	0.1	0.00	0.00
AQMS7 (-6.913581 & 37.564768)	Roadside along MU	20.9	0.00	0.04	0.00	0.00	0.00	0.00	0.00
AQMS8 (-6.936681 & 37.574760)	Water source taping area from river	20.9	0.00	0.04	0.00	0.00	0.00	0.00	0.00
TBS Limits		**-**	**0.1**	***0.6**	**10**	**0.12**	**0.5**	**-**	-
WHO/IFC Guidelines		**-**	**0.12**	**0.5**	**30**	**0.2**	**0.5**	**20**	**-**

Appendix 3: Particulate Matter Levels Measured at Onsite and Offsite

Code & Coordinate	Location	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	VOCs (mg/m^3)
AQMS1 (-6.930008 & 37.55675)	ICT Complex	2	2	0.000
AQMS2 (-6.936051 & 37.557616)	Cafeteria	3	3	0.000
AQMS3 (-6.93141 & 37.557750)	Academic Complex	2	2	0.004
AQMS4 (-6.923993 & 37.556515)	Composting facility	2	2	0.000
AQMS5 (-6.936589 & 37.570977)	Reservoir tanks	2	2	0.000
AQMS6 (-6.913581 & 37.564768)	Residential area	3	3	0.008
AQMS7 (-6.913581 & 37.564768)	Roadside along MU (Mzumbe – Morogoro road)	2	2	0.008
AQMS8 (-6.936681 & 37.574760)	Water source taping area from river	3	5	0.008
TBS Limits		**150**	**75**	**-**
WHO/IFC Guidelines		**50**	**25**	**-**

Appendix 4: Noise levels (in dBA) recorded f at onsite and offsite

Code & Coordinate	Location	Average Noise level in (dBA)
AQMS1 (-6.930008 & 37.55675)	ICT Complex	37.7
AQMS2 (-6.936051 & 37.557616)	Cafeteria	44.9
AQMS3 (-6.93141 & 37.557750)	Academic Complex	43.4
AQMS4 (-6.923993 & 37.556515)	Composting facility	45.4
AQMS5 (-6.936589 & 37.570977)	Reservoir tanks	43.5
AQMS6 (-6.913581 & 37.564768)	Residential area	46.3
AQMS7 (-6.913581 & 37.564768)	Roadside along MU	51.4
AQMS8 (-6.936681 & 37.574760)	Water source taping area from river	50.2
Environmental Management (Standards for Control of Noise and Vibration Pollution) Regulations, 2015		**52**
WHO/IFC Guidelines		**55**

Appendix 5: Vibration levels recorded at onsite and offsite

Code & Coordinate	Location	Vibration (mm/s)
AQMS1 (-6.930008 & 37.55675)	ICT Complex	<0.00
AQMS2 (-6.936051 & 37.557616)	Cafeteria	<0.00
AQMS3 (-6.93141 & 37.557750)	Academic Complex	<0.00
AQMS4 (-6.923993 & 37.556515)	Composting facility	<0.00
AQMS5 (-6.936589 & 37.570977)	Reservoir tanks	<0.00
AQMS6 (-6.913581 & 37.564768)	Residential area	<0.00
AQMS7 (-6.913581 & 37.564768)	Roadside along MU (Mzumbe – Morogoro road)	<0.00
AQMS8 (-6.936681 & 37.574760)	Water source taping area from river	<0.00
Environmental Management (Standards for Control of Noise and Vibration Pollution) Regulations, 2015		**5**
WHO/IFC Guidelines		**5**

Appendix 6: Water Quality Analysis Result

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF WATER

Telegram:" MTO"
Telephone: 255-023-2614748
Fax No. 255-023-2613519
Email: morolab@maji.go.tz

In reply quote Lab.No. MGWQL332 -22/2023

Morogoro Water Laboratory
P.O. Box 826,
Maji Yard, Mazimbu Rd
Morogoro
Tanzania

02nd May, 2023.

GENERAL DESRCIPTION

Analysis requested by .... **CASSIAN LUSHINGE** Region...**Morogoro**...

District...**Mvomero**...Ward...**Mzumbe**...Village/Street...**Changarawe**...SamplingLocation...**Before Treatment**...Sampling Date...**27.04.2023**...Received Date.....**27.04.2023**.... Source of Water...**Tangeni River.**

Type of water...**Natural water**.... Purpose.... **Domestic**.....

Sample collected by .... **Client**....

Coordinate...**6°55'59" Latitude, 37°36'28" Longitude.**

WATER SAMPLE ANALYTICAL RESULTS

Physical/chemical results

	Parameter	Units	Results	Tanzania Standards for Natural Portable Water (TZS 789:2018-EAS 12:2018)
1.	Temperature	°C	23.90	nm
2.	Turbidity	NTU	5.36	25
3.	Color	mg/L Pt Co	33.00	50
4.	pH	-	7.29	5.5– 9.5
5.	Electrical Conductivity (E.C)	µS/cm	43.00	2500
6.	Total Dissolved Solids (TDS)	mg/L	23.65	1500
7.	Phenol Alkalinity	mg/L	0.00	nm
8.	Total Alkalinity (TA)	mg/L as $CaCO_3$	26.00	nm
9.	Carbonates	mg/L	9.10	nm
10.	Non-Carbonates	mg/L	0.00	nm
11.	Total Hardness	mg/L as $CaCO_3$	9.10	600.00
12.	Calcium (Ca^{2+})	mg/L as $CaCO_3$	2.48	150
13.	Magnesium (Mg^{2+})	mg/L as $CaCO_3$	0.71	100
14.	Chloride (Cl^-)	mg/L	7.33	250
15.	Total Iron (Fe)	mg/L	0.18	0.3
16.	Manganese	mg/L	0.09	0.1
17.	Nitrate (NO_3)	mg/L	1.5	45
18.	Nitrite Nitrogen (NO_2-N)	mg/L	0.004	0.9
19.	Sulphate (SO_4)	mg/L	0.00	400
20.	Phosphate (PO_4)	mg/L	0.00	2.2
21.	Fluoride (F)	mg/L	0.12	1.5
22.	Sodium (Na)	mg/L	4.75	200
23.	Potassium (K)	mg/L	0.62	50

nm - not mentioned

Bacteriological results

S/No.	24.	25.	26.
Parameter	Total Coliform CFU/ 100mL (37°C)	Faecal Coliform CFU/ 100mL (44.5°C)	*E. coli* CFU/100mL (37°C)
Results	23	10	9
Comments	Unsatisfactory	Unsatisfactory	Unsatisfactory
Tanzania Standards for drinking water 789:2018-EAS 12:2018	Not detectable	Not detectable	Not detectable

Remarks
Water is soft, contaminated with coliform bacteria.

Recommendation;
According to parameters analyzed, Disinfection process is recommended to kill coliform bacteria.

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Reporting Officer

02/5/2023
Date

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Head of Water Laboratory

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