MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MZUMBE UNIVERSITY – TANGA CAMPUS

ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT FOR THE PROPOSED ESTABLISHMENT OF WASTE WATER STABILIZATION PONDS AND COMPOSTING FACILITY AT MZUMBE UNIVERSITY-TANGA CAMPUS, PANGARAWE VILLAGE, GOMBERO WARD, MKINGA DISTRICT IN TANGA REGION

PROPONENT
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MARCH 2024

EXECUTIVE SUMMARY

1. Background Information

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 wastewater stabilization ponds and Composting facility at Mzumbe University- Tanga Campus in Pangarawe Area, Gombero Village, Mkinga District, Tanga Region. However, the construction and operation of such facilities 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. Project Description

The proposed project involves the establishment of wastewater stabilization ponds and Composting facility within MU-Tanga Campus premises, with a capacity of about 7,740m^3/day. The unit include anaerobic pond, facultative pond and maturation pond. This initiative was driven by the need to accommodate the increasing demand on existing infrastructure due to the development of new facilities, including the Academic Block, two (2) Students Hostels, Cafeteria, Dispensary, four (4) Staff Houses in order to treat all liquid and solid waste generated from the proposed infrastructures. However, there is a need to establish incinerator at dispensary, staff houses and hostel to treat all hazardous waste like clinical waste, non-clinical waste, pharmaceutical waste and other domestic waste like sanitary pad. The terrain morphology of MU-Tanga campus is characterised by flat land with some few moderate anthill and fewer rainfall ditches. Based on topographical data capturing, the area is gently elevated towards the northern side with little slope and Pangarawe area has soil of different strata, the top layer being a mixture of sand and loam soil while clay soil is found within three meter deep.

3. Relevant Policies and Legislation

Some of 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 following tools: 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 WSP process, especially if not managed properly.
- 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.

1. 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

- 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 awareness

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 and enhancement 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 erosion control measures to prevent soil erosion and sedimentation in nearby water bodies.
- Monitor construction activities to minimize noise and dust pollution.
- Schedule construction activities to minimize disruption to the campus and nearby communities.
- Provide awareness to public on pathways communicable diseases.
- 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

Enhancement Measures

- Employ local labor and contractors to stimulate the local economy and reduce the number of migrant workers- 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.
- Develop and implement structured training programs for both skilled and non-skilled laborers in the local communities.
- Provide training to workers on environmental and safety practices.
- Establish a complaints mechanism for addressing construction-related issues promptly.
- Contractor shall conduct awareness programs for the local community, including food vendors, passengers, drivers, and students, to inform them about the upcoming disruptions.
- PIU and Consultant 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.
- Employ people from the surrounding areas to reduce number of migrant workers.

b. Potential mitigation 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

- Implement regular water quality monitoring to ensure the ponds are functioning as intended.
- Establish a maintenance schedule to prevent equipment failures.
- Regular maintenance of the pond infrastructure should be conducted to ensure its efficient operation and to prevent any leaks or breaches that could lead to water contamination.
- Ensure proper disposal of sludge and waste generated during operation.
- A well-defined emergency response plan will be in place to address any accidental spills or contamination events promptly.
- Adequate buffer zones will be maintained around the pond to prevent contamination and to act as a natural filter for any runoff water.

Enhancement Measures

- Develop a community outreach program focused on wastewater management and sanitation education.
- Engage with local schools and institutions for educational programs on environmental conservation.
- Promote water 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.
- Conduct a final community meeting to inform stakeholders about the decommissioning process and outcomes.

7 Environmental and Social Management Plan (ESMP)

An Environmental and Social Management Plan (ESMP) serves as a tool to guarantee that any unnecessary or reasonably avoidable adverse effects during the construction, demobilization, operation, and decommissioning phases of a project's life cycle are prevented. ESMPs are, therefore, crucial instruments for ensuring that the management actions resulting from the ESIA processes are precisely outlined and carried out throughout all stages of the project's life cycle. Contractors and subcontractors awarded the project contract must adhere to the prescribed procedures for construction and commissioning of the proposed development. In terms of reporting arrangements, the project proponent and the Consultant's responsible for Environmental Management will collaborate with experts from various government authorities, such as NEMC and OSHA, to oversee and produce progress reports, as well as weekly, monthly, quarterly, or annual environmental monitoring reports.

8 Environmental and Social Monitoring Plan (ESMoP)

Continuous monitoring of the WSP is an enduring process, commencing during construction and persisting throughout the project's lifespan. This monitoring entails the ongoing or periodic

assessment of mitigation measures to gauge their effectiveness. Consequently, it enables the identification of trends in environmental degradation or recovery and the detection of unforeseen impacts for timely resolution throughout the project's duration. In accordance with the Environmental and Social Monitoring Plan outlined in this report, the project contractor will formulate an Environmental and Social Monitoring Plan, encompassing the mobilization, construction, demobilization, operation, and decommissioning phases. Throughout the project's operational phase, MU will handle the responsibility for monitoring environmental and social impacts. Oversight of environmental and social monitoring related to the proposed WSP compliance with statutory requirements will be managed by MU's Estate officer and MU Management.

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.

Conclusion

The ESIA report concludes that the proposed WSP project at MU-Tanga Campus is environmentally and socially viable. The potential negative impacts identified can be effectively mitigated through the recommended measures, ensuring sustainable wastewater stabilization ponds and contributing to improved water quality in the region. 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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ACKNOWLEDGMENT

Mzumbe University (MU) would like to appreciate all key stakeholders from relevant government agencies, Zone office, the Ministry of Education, Science and Technology (MoEST), Mkinga District Council who have made this scoping study for Environmental and Social Impact Assessment (ESIA) possible. The gratitudes also go to local communities especially the Pangarawe, Gombero, Vunde-Manyinyi, Jirihini, Kichangani and Dima community that were fully involved and participated in a very constructive engagement.

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LIST OF ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
CSO	Civil Society Organization
DED	District Executive Director
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EIS	Environmental Impact Statement
EMA	Environmental Management Act
ESMP	Environmental and Social Management Plan
ESMF	Environmental and Social Management Framework
GA	Government Authority
GBV	Gender Based Violence
GHO	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 Organization
LGA	Local Government Authority
MoEST	Ministry of Education, Science and Technology
TANGA UWASA	Tanga Urban Water Supply and Sanitation Authority
TCU	Tanzania Commission for Universities
MU	Mzumbe University
NEMC	National Environment Management Council
NGOs	Non – Government Organization
OSHA	Occupational Safety and Health Authority
PAD	Project Appraisal Document

CHAPTER 1: INTRODUCTION

1.1 Background Information

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 is planning to use part of the funds to construct wastewater stabilization ponds and composting facility. These plants will be constructed within MU premises located at Mzumbe University's Tanga Campus in Pangarawe area, Gombero Village, Mkinga District, Tanga Region. However, the construction and operation of such facilities 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.

1.2 Rationale and Objective of the MU HEET Project

1.2.1 Objective

The objective of this project is to establish a comprehensive waste management system, including Wastewater Stabilization Ponds (WSP) and a Composting Facility, at MU-Tanga Campus in Tanga Region in order to strengthening the Learning Environments and Labor Market Alignment of Programs in Priority Areas like environmental engineering and technology. The system is designed to accommodate a whole population and support the campus's essential infrastructure, including an Academic Block with Staff offices and Mini library, two Students' Hostels, a Cafeteria, a Dispensary, and four Staff Houses**.** Therefore, the project promotes eco-friendly wastewater treatment and organic waste management, minimizing the campus's ecological footprint.

1.2.2 Rationale

The project aims to address wastewater management and environmental sustainability. It seeks to treat and manage wastewater generated by the proposed campus facilities through stabilization ponds, minimizing pollution and ensuring the responsible use of resources. Also, the project contributes to the health and hygiene of the campus community and the surrounding area. Proper wastewater treatment prevents the spread of diseases and safeguards public health.

The composting facility is an important component of the project as it allows the university to recycle organic waste generated on campus. Composting can reduce the volume of waste sent to landfills, promote resource conservation, and create nutrient-rich compost that will enhance soil fertility for landscaping and agriculture, hence reducing the need for chemical fertilizers on campus.

Generally, the proposed establishment of WSP and a Composting Facility, alongside the development of necessary campus infrastructure, represents a holistic approach to sustainable growth for MU-Tanga campus in Tanga Region. It aligns with the university's commitment to environmental responsibility, academic excellence, and the well-being of its community.

1.3 Objectives of ESIA Study

The objective of the ESIA study was 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 to:

- To carry out environmental screening and scooping study to identify social and environmental risks and impacts in the project site and nearby environment.
- To identify, analyse and assess environmental and social risks and impacts of the proposed construction project.
- 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.
- To recommend cost-effective measures for minimising or eliminating adverse impacts of the proposed design, construction, operation, and maintenance of the project; and
- To prepare Environmental and Social Management Plan, including Health and Safety Management for design, construction, operation, and maintenance phases of the Project
-

1.4 Potential Users of the ESIA report

The ESIA and the associated ESMP are prepared for the use by different stakeholders to be involved in the planning, implementation, management, and monitoring of the project activities. Some of the users will include the World Bank, Developer (MU), Consultant, Contractor, Mkinga District Council, and local government. The report contains useful information on policies and procedures to be adhered to, implementation modalities, analysis of potential environmental and social impacts and suggested mitigation measures at various stages of the project activities.

1.5 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 Mkinga District Council, and Gombero 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:

- Site Reconnaissance
- Analysis of Maps and Plans
- Review of Reports and background documents
- Checklists
- Field Studies
- Public Consultations

1.5.1 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 mechanism through which to raise grievances. Other issues involved review of Mkinga 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.

1.5.2 Site visit

This involved undertaking systematic assessments within and around the proposed project localities. 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 project 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.

1.5.3 Stakeholders 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:

- Gombero, Vunde Manyinyi, Dima, Jihirini and Kichangani Village
- Gombero Ward
- Mkinga District Council

- Occupational Safety and Health Authority (OSHA)
- Fire and Rescue Force
- Tanzania National Electric Supply company (TANESCO)
- Tanga Urban Water Supply Authority (TANGA UWASA)
- Rural Water Supply Agency (RUWASA)
- Tanzania Commission for Universities (TCU)

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.

1.6 Baseline Data and Information

Environmental Consultants identified baseline information that will be required for the ESIA. The Information on the bio-physical, socio-economic environment, institutional and legal regimes were collected from a variety of sources, namely project documents and general literature review, visual and inspection, expert opinion, and consultations with selected stakeholders. Data/information gaps were identified and strategies for collecting the information before or during the environmental impact statement study will put in place.

1.6.1 Physical 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.

Air quality

Air quality measurements were done to determine ambient dust in terms of particulate matter and pollutant gases at the project site. Particulate matters were measured at site in terms of $PM_{10,}$ and $PM_{2.5}$ by using Dust Monitor which complies with the EMC Directives. Ambient pollutant gas (i.e. CO, NOx, NO_2, SO_2, H_2S, and VOCs) concentration were measured using gas analyzer 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.

Noise and Vibration

Spot measurements were done on site to determine noise levels at the project site using Sound level meter device. 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 in accordance with European standard EN 14253:2003. 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.

1.6.2 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 community in the area about the presence of any significant species.

1.6.3 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:

- Population and settlement characteristics
- Land uses and livelihoods.
- Community structure, employment, and income
- Developments underway

- Infrastructure in place
- Water supply and other utilities
- Waste management practices.
- Recreational activities
- Energy supply
- Public health and safety
- Access to and delivery of health, education, and social services

1.7 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.

1.8 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 Mkinga District Council.

1.9 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) Acknowledgement
iv) List of Acronyms

1. Introduction
2. Project description
3. Policy, administrative and legal framework
4. Baseline/ Existing conditions
5. Stakeholders Analysis
6. Assessment of Impacts and Identification of Alternatives
7. Environmental and Social Mitigation Measures
8. Environmental and Social Management Plan
9. Environmental and Social Monitoring Plan
10. Resource Evaluation / Cost Benefit Analysis
11. Decommissioning and Closure
12. Summary and Conclusions

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CHAPTER 2: PROJECT DESCRIPTION

2.1 Location and Accessibility

2.1.1 Location

The project area for proposed establishment of MU-Tanga Campus is located in the Pangarawe area, Gombero ward, Mkinga District in Tanga Region (Table 2.1). Gombero ward lies at the border between Tanga city and Mkinga district council. It is bordered by Mzizima and Mabokweni wards in Tanga city on the Eastern side, Mapatano and Mnyenzani wards on the Eastern side, Bwiti ward in the northern, and Zigi River which separate it with Kiomoni ward which is in Tanga city to the southern side (Figure 2.1 & 2.2). Gombero ward is subdivided into six (5) Sub-wards (Villages); namely Gombero, Kichangani, Jihirini, Vunde Manyinyi, and Dima. Despite being in Mkinga district, Gombero sub-ward is located close to Tanga city than its district headquarters at Mkinga. This causes the majority of products and services to be accessed by residents from Tanga city.

Table 2.1: GPS Coordinate for the project area

Point		Longitude(E)	Latitude(S)
1	WSP	38.9503	-4.99338
2	Composting facility	38.9518	-4.99046

2.1.2 Accessibility

The MU-Tanga Campus can be accessed via three routes: Rubawa Primary School, Pangarawe Centre, or Gombero Centre. These routes are connected by an unpaved dirt road that originates as a junction at Mabokweni along the Tanga-Horohoro main road and continues to Maramba. The distance from the junction to the Campus site is approximately twelve kilometers (12km) on an unpaved dirt road, which is accessible year-round. Additionally, the distance from the Mabokweni junction to Tanga city is approximately eight kilometers (8km) on the tarmac of the Tanga-Horohoro main road. Consequently, the MU-Tanga site is situated approximately twenty kilometers (20km) from the city centre of Tanga.

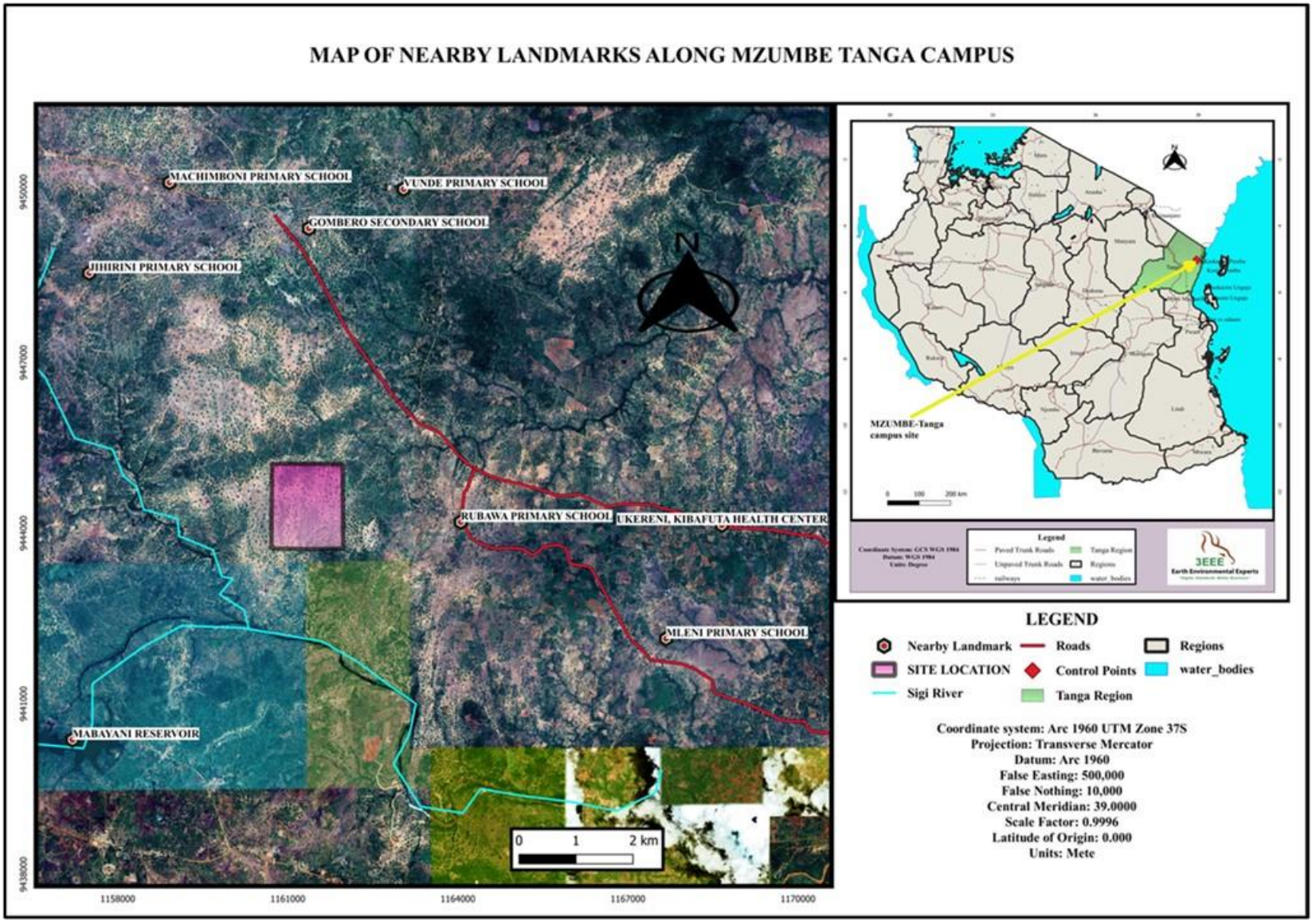

Figure 2.1: Map show facilities close to MU-Tanga Campus
(Source: 3Es September 2023)

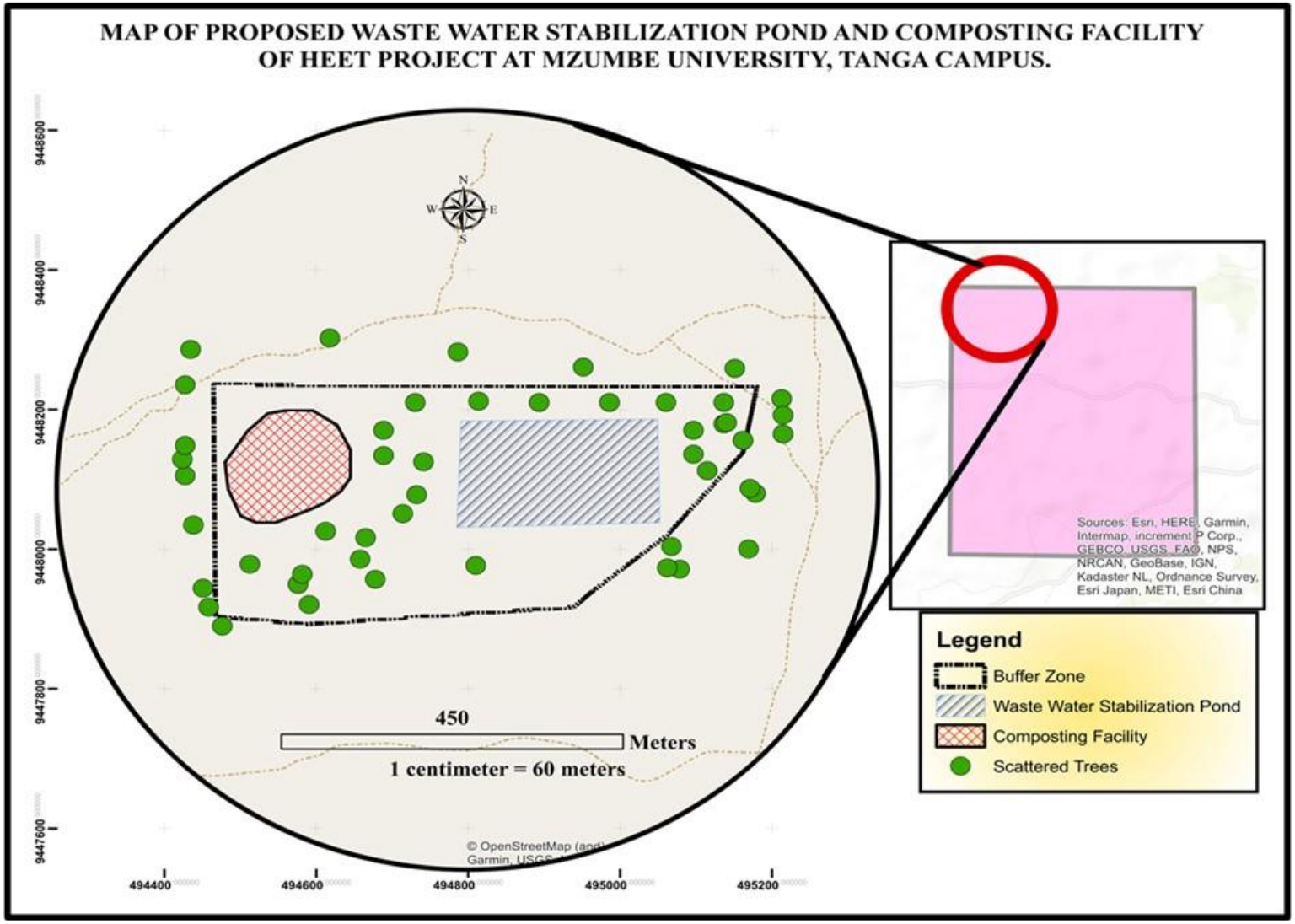

Figure 2.2: Location map of MU-Tanga Campus display proposed area for the establishment of WSP and Composting facility. (Source: 3Es September 2023)

The project site is within the area characterized by sandy clay loams and sandy clay soils, different natural and secondary vegetation i.e. tree species, and thorny vegetation cover the surface land. No sensitive ecological sites are found near the proposed sites.

The site is on a surveyed and planned area for educational purposes and other purposes ancillary thereto. Based on title deed (Appendix 1) the land and the facilities places thereon shall be maintained and same shall be used for Education Building Purpose Only. Use Group K classes (d) as defined in Urban planning Act (Use Groups and Use Classes) Regulation, 2018. The land is legally owned by MU.

2.1.3 Major Adjacent developments

There are no major developments taking place in the area. The site is surrounded by indigenous trees which are short trees, shrubs with thorns, lawn & few cactuses.

2.2 Project Scope and Activities

The proposed project shall deal with establishment of WSP and Composting facility within the university to treat all wastes generated by the proposed facilities at MU-Tanga campus.

2.2.1 Description of Proposed Project Site

i. Wastewater Stabilization Ponds (WSP)

This will involve construction of a complete unit of Water Stabilization Ponds (WSP)/ Oxidation Ponds. This will involve site clearance and grubbing within the limits of permanent works, Stone Masonry and Stone Pitching for erosion controls, vegetation growth for erosion control outside of ponds, pipe laying from end users to the ponds/ conveyance system including excavation and backfill, access roads to and within ponds area (Gravel layer) that will be used for treatment of wastewater from the proposed buildings.

ii. 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.

2.3 The Project Designs

The project will involve the establishment of wastewater stabilization ponds which having a capacity of about 7,740m^3/day. The unit include anaerobic pond, facultative pond and maturation pond.

2.3.1 Design Loads

The Table shows design load data defined for the household crude water. The values given in the table, are defined based on multiple measurements; they are internationally recognized and introduced in many countries as the standard values.

Table 2.2: Table Adopted Wastewater quality.

S/N	Wastewater parameter	Value adopted for the design
1	BOD	40g per capital per day
2	Faecal Coliform	$1x10^8$ per 100ml
3	Helminth Eggs	500
	Design Temperature (coolest temp)	20^0C

Source: MU Master Plan

2.3.3 Process in wastewater stabilization ponds.

i. Anaerobic pond

Anaerobic ponds are commonly 3m deep, 44m length, 44m wide, 1,966m^2 surface area and receive wastewater with high organic loads (i.e., usually about than 100-267 g BOD/m^3.day, equivalent to more than 3000 kg/ha. day for a 7,740 m^3/day). They normally do not contain dissolved oxygen or algae. In anaerobic ponds, BOD removal is achieved by sedimentation of solids, and subsequent anaerobic digestion in the resulting sludge. The process of anaerobic digestion is more intense at temperatures above 15ºC. The anaerobic bacteria are usually sensitive to pH <6.2. Thus, acidic wastewater must be neutralized prior to its treatment in anaerobic ponds. A properly designed anaerobic pond will achieve about a 40% removal of BOD at 10º C, and more than 60% at 20º C. A shorter retention time of 1.0 - 1.5 days is commonly used. There is some removal of solids-associated bacteria in anaerobic ponds, principally by sedimentation.

ii. Facultative Pond

Facultative ponds (1.2m deep, 50m length and 50m wide) are of two types: Primary facultative ponds that receive raw wastewater, and secondary facultative ponds that receive particle-free wastewater (usually from anaerobic ponds, septic tanks, primary facultative ponds, and shallow sewerage systems). The process of oxidation of organic matter by aerobic bacteria is usually dominant in primary facultative ponds or secondary facultative ponds.

The processes in anaerobic and secondary facultative ponds occur simultaneously in primary facultative ponds. It is estimated that about 30% of the influent BOD leaves the primary facultative pond in the form of methane. A high proportion of the BOD that does not leave the pond as methane ends up in algae. This process will require more time, more land area, and possibly 2-3 weeks water retention time, rather than 2 -3 days in the anaerobic pond. In the secondary facultative pond (and the upper layers of primary facultative ponds), sewage BOD is converted into "Algal BOD," and has implications for effluent quality requirements. About 70 – 90% of the BOD of the final effluent from a series of well-designed WSPs is related to the algae they contain.

iii. Maturation Pond

The maturation ponds for this operation will require 0.8m deep, 62m length and 62m wide receive the effluent from the facultative ponds. At this stage the main function will be to remove excreted pathogens. Although maturation ponds achieve only a small degree of BOD removal, their contribution to nutrient removal also will be significant. Maturation ponds usually show less vertical biological and physicochemical stratification and are well-oxygenated throughout the day. Although faecal bacteria are partially removed in the facultative ponds, the size and numbers of the maturation ponds will determine the numbers of faecal bacteria in the final effluent.

The functionality of wastewater stabilization ponds relies on a combination of physical, biological, and chemical processes:

- **Sedimentation;** As wastewater flows into the ponds, suspended solids settle at the bottom of the ponds through gravity, allowing for their removal and subsequent stabilization.
- **Biological Degradation;** Microorganisms, including bacteria, algae, and protozoa, present in the ponds, break down organic matter through various biological processes, including aerobic and anaerobic degradation.
- **Natural Oxidation;** Oxygen is supplied to the ponds through atmospheric exchange and algal photosynthesis, promoting aerobic degradation and the removal of organic pollutants.
- **Pathogen Removal;** As wastewater passes through the ponds, exposure to sunlight, elevated temperatures, and microbial action helps in the inactivation and reduction of pathogens, making the effluent safer for release into the environment.

The specific design parameters, including pond size, depth, and hydraulic retention time, are determined based on factors such as wastewater characteristics, climate conditions, and effluent quality requirements. Adequate monitoring and maintenance of the ponds are essential to ensure their optimal performance in treating wastewater effectively and minimizing any potential environmental impacts.

2.3.4 Project design considerations

The overall design of the pond will promote environmental best practice by enhancing the impermeable materials like PVC liner and compacting clay soil to prevent any potential seepage. Pond base and embankment will be also enhanced during construction. The bottom of the pond will be strictly impermeable, although the sludge layer is expected to seal up small pores in the soil. Sealing of the base is necessary to prevent ground water pollution.

Therefore, plain in-situ concrete is adopted for the ponds base, sides and on top of embankment to protect it from erosion.

The plain-in-situ concrete stop vegetation growth down the banks and so prevent the breeding of mosquitoes and makes maintenance easier. The following are the design criteria that will be followed during the design of the ponds.

- **Sewage flow rate**: This is based on eighty percent of 120L/C/d water consumption as stipulated by the National subcommittee on water supply and sanitation for urban areas.
- **Temperature:** The mean monthly ambient air temperature of the coldest month is 00C. 230C is the design temperature suitable for tropical countries**.**
- **Retention time**: This is the time required for the sewage BOD5 strength to reduce to the desired strength. It is usually minimum seven (7) days.
- **Influent concentration**: this is determined in the laboratory analysis. The result of the test shows that the BOD5 is 400mg/L which is medium strength. This is as a result that only domestic waste is being discharge and waste stabilization pond can handle sewage of this strength. Therefore, the use of anaerobic pond is not necessary since they are meant to receive very high strength organic sewage.
- **Effluent standard required**: Effluent standard adopted by (D Mara, 1972) is 50 ± 70 mg/l BOD5 for facultative pond and less than 25mg/L for maturation pond. Field experience in Africa has shown that an average of 60mg/L is adopted for facultative pond effluent.

2.4 Project activities

Activities for the project will be implemented in four phases namely mobilization, construction, demobilization, operation and maintenance and decommissioning phases. Details of each of the phases will be provided in the sections that follow.

2.4.1 Mobilization Phase

Planning phase for the project commenced in August 2023 and will be concluded in January 2024. Activities during mobilization phase will include;

a) **Topographical Survey**- The topographical survey shall be done by Surveyors to establish the boundaries and the ground levels.

b) **Project Planning and designing**- This includes feasibility study and site assessment to determine the suitability of the location for the wastewater stabilization pond, and Engagement of a qualified engineering firm to design the WSP system based on the specific needs and regulatory requirements.

c) **Geotechnical investigations, Hydrological and Hydrogeological study** - Geotechnical investigation will involve drilling the ground to study the soil profile the underling geological formations.

Both **hydrological** and **hydrogeological** studies shall be conducted to ensure effective design, operation, and environmental protection. A hydrological study assesses surface water flow patterns, rainfall distribution, and runoff characteristics in the area. This information helps determine the water supply and drainage requirements for the stabilisation ponds, ensuring they can effectively treat the wastewater without causing flooding or overflow issues. On the other hand, a hydrogeological study focuses on understanding the groundwater flow regime, aquifer characteristics, and potential interactions between surface water and groundwater. This knowledge is essential for evaluating the potential for groundwater contamination from the wastewater ponds and designing appropriate measures to prevent pollution. Both studies provide essential data for site selection, pond sizing, and design considerations to ensure the WSP operates efficiently while minimizing negative impacts on the surrounding environment and water resources.

d) **Acquisition of various permits/ certificates**-This include necessary permits and approvals from local environmental regulatory authorities.

e) **Procurement and Contracting -** This involves development of procurement documents, including specifications, terms of reference, and evaluation criteria, for the selection of contractors or construction firms.

2.4.2 Construction Phase

2.4.2.1 Consideration for constructing different structures.

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

a) Founding conditions

The proposed construction of WSP 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 WSP.

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.

Construction activities is expected to take place for **18 months** starting from September 2023 to March 2025. Over 100 people will be employed to work at the site when construction activities begin and 30% will be women. Construction activities will involve land clearing, landscaping, grading, excavation, compacting, trenching, construction of a workers' camp which will provide hostels to workers, storage facilities and an office facility, backfilling with compaction consolidation, levelling and earth marking, and transportation of construction materials.

2.4.2.2 Construction Activities

Activities during construction phase will be including site preparation, construction of workers camp, construction of WSP, 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.

b. Construction materials

Different raw materials will be required during construction phase. Materials such as sand, gravel and quarry stone will be outsourced from different places. The concrete embankment materials such as quarry stone, gravel and sand will be collected from approved sites.

Other materials such as cement, concrete block, reinforced steel, insulation boards/materials, PVC (Polyvinyl Chloride/non-pressure pipes), Fiberglass reinforced plastic (FRP), Geosynthetic clay liner (GCL), paints and other joinery, fuel and oil, electricity and water.

NB; A contractor who will be awarded the construction bid will have to adhere to Health, safety and Environmental (HSE) standards as per construction regulation. MU will have the key personnel who will be responsible for checking the Standard operation procedures (SOP) to comply with the legal requirement.

c. Construction of WSP and Composting facility

Some of the activities to be undertaken will include.

d. Excavating and shaping the pond basins according to the design specifications.
e. Constructing the pond walls, berms, and embankments using appropriate materials such as clay or compacted soil.
f. Installing any necessary liners or geomembranes to prevent seepage or leakage.
g. Constructing inlet and outlet structures to control the flow of wastewater into and out of the ponds.

h. Construction equipment

Different machinery will be used to construct the project facilities. These will include:

- Bull Dozers for clearing the site, removal of topsoil and vegetation materials, and pushing out stumps;
- Graders for grading and levelling land for buildings and access road formation;
- Tippers/lorries for transporting construction materials and workers;
- Light machinery like pedestrian rollers for access road compaction;
- Front end loader for loading materials onto tippers and lorries;
- Several light equipment like wheel burrows, shovels, picks;
- Concrete mixers;
- Compactor;
- Wheelbarrow; and

- Hammers and bolt and nut fasteners, hand saw, electric and gas welders, electric saws and grinders, load roller, trucks, hand drills and drill bits, wire cutters, concrete mixer trucks, wheel loader, forklift, excavator etc.

i. Installation of Piping and Infrastructure

Some of the activities to be undertaken will include:

- Installing pipes and fittings for wastewater inflow and outflow.
- Constructing sedimentation and sludge removal structures, such as settling chambers or sludge removal channels.
- Setting up monitoring and control equipment, including level sensors, flow meters, and possibly aerators for oxygenation.

j. Landscaping and Vegetation

Some of the activities to be undertaken will include;

- Establishment of appropriate vegetation around the pond perimeters and on embankments to enhance aesthetics, stability, and ecological functions.
- Plantation of aquatic vegetation within the ponds to promote natural processes and enhance treatment efficiency.

k. **Erosion Control and Drainage**

Some of the activities to be undertaken will include;

- Implementation of erosion control measures to prevent soil erosion and sedimentation in and around the construction site.
- Installation of proper drainage systems to manage stormwater runoff and prevent pond flooding during heavy rainfall events.

l. Health and Safety Measures

This will involve;

- Implementation of appropriate health and safety protocols to protect workers and ensure compliance with occupational health and safety regulations.
- Provision of necessary personal protective equipment (PPE) for workers and conducting safety training programs.

m. Environmental Monitoring

This will include;

- Implementation of environmental monitoring measures to assess and mitigate potential impacts on the surrounding ecosystem during construction.
- Monitoring water quality, sedimentation, and any potential release of construction-related pollutants.

n. Documentation and Reporting

This will involve;

- Keeping detailed records of construction activities, including site plans, construction drawings, and progress reports.
- Documenting any deviations from the original design or unforeseen challenges encountered during construction.

2.4.3 Demobilization Phase

The demobilization phase involves the removal of equipment, tools, and personnel from a construction site once the project is completed or at a temporary pause. It includes activities like dismantling temporary structures, returning rented equipment, and ensuring the site is safe for public use. Also, any

leftover solid materials 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.

2.4.4 Operation and maintenance phase
Activities during operation and maintenance phase will include commissioning the use and regular maintenance of these new premises.

2.4.5 Decommissioning phase
During the decommissioning phase of the wastewater stabilization ponds (WSP), several crucial activities must be carried out to safeguard the environment from pollution. These activities include:

- **Waste Removal**; Proper removal and disposal of sludge and residual waste materials from the WSP to prevent contamination of soil and water.
- **Decontamination**; Thoroughly clean and decontaminate equipment, tanks, and infrastructure used in the WSP to eliminate potential pollutants.
- **Environmental Monitoring**: Continuously monitor water quality, soil conditions, and air quality during decommissioning to detect and address any emerging pollution risks.
- **Hazardous Materials Handling**: Safely manage and transport any hazardous materials or chemicals used in the WSP to prevent spills or leaks.
- **Site Remediation**: Remediate the decommissioned site by restoring it to its original state or converting it to an alternative beneficial land use, following environmental guidelines.
- **Closure Reporting**: Document and report on the decommissioning process, including all measures taken to mitigate environmental risks, for regulatory compliance and transparency**.**
- **Community Engagement**: Maintain open communication with local communities to address any concerns and provide information about the decommissioning activities and their potential impacts.
- **Regulatory Compliance**: Ensure full compliance with environmental regulations and permits throughout the decommissioning process.
- **Safety Measures**: Implement safety protocols to protect workers and the surrounding environment during decommissioning activities.
- **Record Keeping**: Maintain comprehensive records of all decommissioning activities, including waste disposal and environmental monitoring results, for future reference and audits.

2.5 Manpower and Utility Requirements
2.5.1 Manpower Requirements
The proposed project will temporarily employ about 100 people during construction phase. Employment during construction phase will be under contractor and will be in the form of skilled as well as unskilled labourers considering all gender types. For the semiskilled and unskilled labourers, 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.

2.5.2 Energy Supply
The campus will be connected to the national grid on the line from Tanga City-Horohoro, at Pangarawe road junction. Along Pangarawe road, the medium transmission line is planned to the proposed campus, thus making it easy for connection after stepping down/up the transformer. Based on the power use, the average electricity demand for the campus is 4125KVA per month, equivalent to a consumption of 137.5KVA per day. Though the proposed establishment of WSP and composting facility does not use electricity during its operation.

2.5.3 Water Supply
The water supply plan for the proposed MU-Tanga campus in Tanga will rely on three potential sources. The primary and most dependable source will be Tanga UWASA, utilizing connections from the existing transmission line along Tanga-Horohoro road, which is situated approximately 12 kilometers from the campus location.

2.6 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.

2.6.1 Products
The final product of this proposed project, MU will be able to treat all waste generated from the proposed facilities.

2.6.2 By-Products
The by-products will be disposed-off as follows:
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.
- **Sludge;** Over time, sludge accumulates at the bottom of wastewater stabilization ponds as a by-product of the treatment process. This sludge is a mixture of organic and inorganic materials that require appropriate management and disposal.

2.6.3 Solid Waste
2.4.3.1 Construction phase
During the construction phase of a WSP and composting facility, various solid wastes can be generated. These wastes typically include construction debris, excavated materials, packaging materials, surplus materials, and other waste generated from construction activities. Proper management of these solid wastes is crucial to ensure environmental sustainability and compliance with waste management regulations. The following are common solid wastes generated during the construction phase of WSP and their management described in table 2.3.

Table 2.3: Waste generation and treatment during construction Phase

Waste type	Treatment or Disposal Methods
Construction Debris	○ Construction debris such as concrete, bricks, timber, and metal scraps should be sorted and segregated on-site. ○ Recyclable materials should be separated for appropriate recycling facilities. ○ Non-recyclable debris should be disposed of at designated waste management facilities (Mpirani landfill) in accordance with local regulations.
Excavated Materials	○ Excavated materials, including soil and rocks, can be reused or recycled if suitable. ○ Clean soil can be stockpiled for future use in landscaping or regrading purposes. ○ Contaminated soil or hazardous materials should be handled and disposed of according to proper waste management protocols, including treatment or proper containment.
Packaging Materials	○ Packaging materials, such as cardboard boxes, plastic wrap, and pallets, should be collected separately for recycling or reuse whenever possible. ○ If recycling facilities are not available, these materials should be disposed of at Mpirani landfill
Surplus Materials	○ Surplus construction materials, such as pipes, fittings, and equipment, should be carefully managed. ○ Excess materials that are in good condition can be donated or sold for reuse in other construction projects. ○ Materials that cannot be reused should be recycled if possible or disposed of properly following waste management regulations.
Hazardous Wastes	○ Hazardous wastes, including paints, solvents, oils, and chemicals, should be handled and disposed of in accordance with local hazardous waste regulations. ○ These materials should be stored in designated containers, labeled appropriately, and transported by authorized waste management service providers for safe disposal or treatment at Mpirani landfill.

2.6.1.1 Operation phase

During the operation phase of a WSP, various solid wastes are generated as byproducts of the treatment process. These solid wastes require proper management to ensure environmental protection and public health. Here are some common solid wastes generated during the operation phase of wastewater stabilization ponds and their management practices.

Table 2.4: Waste generation and their management during construction Phase

Waste type	Management/Treatment/Disposal Methods
Floating Debris; This includes leaves, twigs, plastics, and other floating materials, can accumulate on the surface of the ponds.	○ Debris can be manually or mechanically removed using nets, screens, or skimmers. Collected debris should be properly disposed of, considering recycling or waste management regulations. ○ Regular maintenance: Pond operators should conduct routine inspections and remove floating debris to ensure the efficient flow of wastewater and prevent potential blockages
Sludge; Sludge is the accumulated solids that settle at the bottom of the ponds during the treatment process.	○ Sludge can be dewatered and further treated through processes such as sludge drying beds, mechanical dewatering, or sludge treatment plants.

Waste type	Management/Treatment/Disposal Methods
	○ Proper disposal methods may include land application, incineration, or landfilling, depending on the characteristics of the sludge and local regulations.
Algal Biomass; Algal growth is a natural occurrence in wastewater stabilization ponds due to nutrient availability and sunlight exposure. Excessive algal biomass can lead to oxygen depletion, odor issues, and hinder the clarity of the treated effluent.	○ Management practices for algal biomass involve monitoring and controlling nutrient levels in the influent to minimize excessive growth. ○ Mechanical removal methods, such as raking or skimming, can be employed if algal biomass reaches problematic levels. The removed biomass can be composted, landfilled, or used as a source of renewable energy through anaerobic digestion.

2.6.4 Liquid waste

2.6.4.1 Construction phase

During the construction phase of a WSP, several liquid wastes will be generated and treated through temporary onsite wastewater treatment system. These wastes can include (Table 2.5).

Table 2.5: Liquid Waste generated and their management during construction Phase.

Waste type	Management/Treatment/Disposal Methods
Stormwater runoff	○ Implement effective erosion and sediment control measures, like silt fences, sediment basins, and check dams, to prevent soil erosion and capture sediment-laden runoff. ○ Properly manage stormwater by directing it away from sensitive areas and into designated retention ponds or swales.
Domestic Wastewater from On-Site Facilities	○ Temporary facilities for workers can generate domestic wastewater. Ensure proper sanitation and manage the wastewater through temporary soak pit away systems or holding tanks. Regularly pump out and dispose of the waste at approved facilities.
Concrete Wash Water Construction activities often involve the use of concrete, which requires regular equipment cleaning. Concrete wash water contains high pH levels, cement particles, and other chemicals used in the concrete mixture.	○ Concrete wash water should not be allowed to enter directly into receiving environment, as it can harm the ecosystem. It should be contained and collected separately into proper facilities. The water can be treated using methods like sedimentation and pH adjustment before being discharged or reused in non-sensitive areas.
Spillages and Leaks This includes accidental spillages or leaks of fuels, oils, lubricants, or other chemicals during construction period	○ It is essential to have spill response plans in place to minimize environmental impacts. ○ Spill kits and containment measures should be readily available, and proper cleanup and disposal procedures should be followed to prevent contamination of soil and water.

2.6.4.2 Operation phase

During the operation phase of a WSP, several liquid wastes may be generated this include treated effluent, overflow and spills (Table 2.6). Proper management of effluent is crucial to prevent adverse impacts on receiving water bodies or nearby ecosystems. These wastes can include.

Table 2.6; Liquid Waste generated and their management during operation Phase.

Waste type	Management/Treatment/Disposal Methods
Treated Effluent	○ Regular monitoring of effluent quality to ensure compliance with applicable standards and regulations. ○ Implementation of appropriate treatment processes, such as disinfection or filtration, if needed, to meet effluent quality requirements. ○ Establishing an effluent discharge point and ensuring proper dispersion to minimize the impact on receiving water bodies. ○ Regular maintenance and inspection of the stabilization pond system to ensure its efficient operation and optimum treatment performance
Overflow or Spills During heavy rainfall events or maintenance activities, there is a possibility of overflow or spills from the stabilization pond. This can lead to the release of untreated or partially treated wastewater into the surrounding environment, posing risks to water quality and ecosystems.	○ Adequate design and maintenance of the stabilization pond system to minimize the likelihood of overflow or spills. ○ Implementation of appropriate emergency response measures, such as containment systems or diversion structures, to mitigate the impacts of accidental spills. ○ Regular inspection and maintenance of the stabilization pond infrastructure to identify and address potential issues before they escalate.

2.6.5 Stormwater management

Storm water will be managed properly to improve drainage within the development.

2.6.6 Hazardous waste

The main hazardous wastes that will be generated at the site are concrete additives, tins, scrap metal etc. These wastes will be collected within the designated dustbin then taken to the storage area and finally disposed by an authorized contractor.

2.7 Occupational health and safety (OHS)

2.7.1 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 awarded contractor will provide relevant trainings to students which are close to the proposed establishment in order 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.

2.7.2 OHS During operation phase.

All the safety issues will be taken into consideration; 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 outlines in detail the potential accidents/emergencies and how to respond; this document will also explain how to mitigate environmental hazards. 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 placed in several strategic points and occasionally serviced.

2.7.3 Information and Education
Clear warnings and information will be placed at strategic locations around the project. In case of an emergency a system for notifying neighborhood will be developed. Posters highlighting safety measures in different location will be displayed. Training courses will be organized regularly to educate workers and students about the importance and procedures of safety measures.

2.8 Gender analysis and mainstreaming
Act No. 15 of 1984 art 6 of the Constitution of Tanzania uphold the principle of equal rights for men and women and prohibit any discrimination based on gender or marital status. The Republic of Tanzania ratified the Convention on 'The Elimination of All Forms of Discrimination against Women' in 1987. Tanzania signed the Optional Protocol in 2000 but has yet to proceed with ratification. It ratified the Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa in 2005. Tanzania has achieved gender parity with respect to primary school enrolments, which indicates an improvement in attitudes towards girls' education.
MU has deliberated Policy to encourage the employment of both men and women. The policy also encourages that there should be equal employment benefits for both men and women.
The contractor for the project will therefore be encouraged to use the policy to ensure that there are equal employment opportunities for both men and women.

2.9 Project boundaries
Identification of boundaries within which the ESIA study is undertaken is an important component of the environmental and social assessment study. There are three types of boundaries which are institutional, temporal and spatial boundaries.

2.9.1 Institutional boundaries
Institutional boundaries refer to those institutions and sectorial boundaries in which the project lies or rests. These will be determined from political boundaries, Acts, regulations and institutional mandates and administrative structures. The proposed development is about the establishment of WSP and composting facility at MU-Tanga Campus. The key institutions that will oversee the implementation of the project activities will include;

- Ministry of Education Science and Technology
- Mkinga District Council
- Tanzania Commission of Universities (TCU)
- Occupational Safety and Health Authority (OSHA)
- Tanga UWASA
- RUWASA
- Pangarawe, Gombero, Vunde manyinyi, Jirihini, Kichangani and Dima community

These institutions will be consulted in this ESIA process, as the key stakeholders with interest in the development at MU-Tanga Campus for environment and economic prosperity of the local people and Tanzanians in general.

2.9.2 Temporal boundaries
Temporal boundaries refer to the lifespan and reversibility of impacts. For example, the impact of construction work for the WSP and composting facility project may be short-lived, but the presence of

these facilities in the selected site may have implications that stretch far into the future until when decommissioning is undertaken. In addition, consideration needs to be given to what happens when the project ends, where there is a need for site restoration and decommissioning of all established facilities. Therefore, some of the impacts that may occur during construction, e.g., noise caused by bulldozers will disappear as soon as the construction phase will be completed. The construction period will last while the operational phase will be designed for several years unless unforeseen event occurs.

2.9.3 Spatial boundary

The spatial dimension encompasses the geographical spread of the impacts regardless of whether they are short term or long term. The spatial scale considers the receptor environmental component and can be local or broader. Two zones of impacts 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 Pangarawe area (where project will be located) and its nearby areas (Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima Villages) 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 Gombero ward in Mkinga 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.

2.10 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). Some part of the financial support which is about 2,518,574,510.93 TZS will be used for this project.

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 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 Compliance

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 met a national environmental policy requirement by implementing measures to control and reduce pollution anticipated during the construction and operational phases of the WSP and composting facility.
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 WSP and Composting will be 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, roadworks, 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 its construction. Implementation of the proposed establishment will use of cost effective and environmentally friendly technologies to minimize wastage of resources specially 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.

S/N	POLICY	REQUIREMENT	COMPLIANCE STATUS
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, 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.	The proponent will adhere to the policy by availing HIV/AIDS information and voluntary screening services to its workers as well as observing other provisions of the policy.
8	The National Water Policy (URT, 2002)	The National Water Policy (NAWAPO) mandates the adoption of a comprehensive approach that integrates planning and management across multiple sectors and objectives. This approach aims to minimize adverse impacts on water resource development, thereby ensuring the sustainability and protection of both the resource and its surrounding environment. The policy emphasizes this holistic perspective by requiring that all water abstractions and effluent discharges into water bodies must obtain permits, specifying the intended beneficial use and the designated timeframe. Additionally, the policy sets a goal to promote environmentally friendly wastewater treatment systems. To prevent the indiscriminate discharge of wastewater and contamination of water sources, the project proponent should ensure proper management and disposal of wastewater sludge and treatment facilities capable of accommodating the whole university.	The proposed establishment of WSP at MU shall be designed in such a way that there is no any leaks or breaches that could lead to water contamination. 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 objective 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.

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 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.
4	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.
5	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	Therefore, the proponent shall abide by this Act by carrying out construction by adhered consulting firm.

S/N	LEGISLATION	REQUIREMENT	COMPLIANCE STATUS
		appropriate professionals who are registered by the board are involved in undertaking works as required by the law.	
6	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. the proponent shall have discharge permit from responsible authority for its proposed WSP for waste water treatment.	The proponent shall adhere with the act by ensuring the protection of surface and ground water resources. Also, MU will acquire water use and discharge permit from Pangani basin for Zigi river.
7	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.
8	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.
9	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.
10	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.

3.4 Relevant Regulations and Guidelines

Table 3.3: Regulations Compliance

S/N	REGULATIONS	REQUIREMENT	COMPLIANCE STATUS
1	The Environmental Management	The Environmental Management (Environmental Impact Assessment and Audit) Amendment Regulations, 2018, are part of Tanzania Environmental Management	Proponent has carried out this ESIA, hence, the

S/N	REGULATIONS	REQUIREMENT	COMPLIANCE STATUS
	(Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018	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	requirements of these regulations are observed.
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.
13	The Environmental Management (Solid Waste Management) Regulation, 2009 as amended in 2016	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 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.	MU will ensure proper handling of construction and operational 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.

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 realization 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 National Five-Year Development Plan (FYDP III) 2021/22-2025/26

In implementing the Third Five Year National Development Plan the Government will focus on stimulating an inclusive and competitive economy, strengthening industrial production capabilities and service delivery, promoting investment and trade, bringing development to our citizens and building human resource capacity.

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 (POM)

This 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, Tanga. 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. It is supported and -complimented by a series of technical documents which will provide further guidance on key project components.

It should 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 from Mzumbe University and its associated parties tasked with implementing and monitoring any part of HEET-Mzumbe, including consultants, contractors and the surrounding communities. It may also be of use by technical and development partners involved in the education sector to ensure greater coherence in development of education project designs. This POM will be updated as needed to reflect any changes made during project implementation. Any changes to the POM will require clearance by MoEST, as recommended by the National Project Steering Committee (NPSC). All revised versions of the POM will be submitted to the World Bank for non-objection. In the event of a conflict between the provisions laid out in the POM and the Project's Financing Agreement, the Financing Agreement shall govern.

3.5.4 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.

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 discouraging the use of solid biomass fuels and encourage utilization 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 utilization 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 deforestation, manage water resources and induce water harvesting technologies.*

3.6.5 International Labour Convention

International Labor Organization (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

Table 3.4: 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 proposed project for MU at Tanga campus will use this requirement to strengthen the environmental and social framework for the assessment, development, and implementation of World Bank-financed projects where appropriate.
ESS2: Labour and Working Conditions	YES	The standard focuses on the adoption of standard labour practices that consider 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 labour 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 organizations. Provisions on child labour and forced labour. 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 ensures their safety against project activities. It requires infrastructure to consider 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.
ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	YES	Land for the proposed project is legally owned by MU (Appendix 3), but contract may need to acquire land for quarrying

Environmental and Social Standards (ESS)	Applicability	Requirements
ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	YES	The area of the proposed establishment of MU facilities is covered by indigenous trees which are short trees, shrubs with thorns, lawn and few cactuses. Although not a sensitive ecological system the project will develop and implement measures to mitigation degradation as will be described in the ESMP.
ESS7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	NO	This standard is not applicable in this project because there is no any requirement 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 no any requirement related to ESS9.
ESS10: Stakeholders' 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.

3.7 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 3.4 below.

Table 3.5: Legal and Institution framework

Level	Institution	Role and responsibility
National Level	Vice Presidents Office (Division of Environment)	○ Coordinate the implementation of the National Environmental Policy. ○ Coordinate various environment management activities in Tanzania. ○ Advise the Government on legislative and other measures for the management of the environment. ○ Advise the Government on international environmental agreements. ○ Monitor and assess activities, being carried out by relevant agencies in order to ensure that the environment is not degraded. ○ Prepare and issue a report on the state of the environment in Tanzania.
	Vice Presidents Office (NEMC)	○ Coordinate Environmental Management Policy, Act and EIA guidelines. ○ Approval of ToR, Review of ESIA ○ Issuing an Environmental Certificate ○ Review and recommend for approval of environment impact statements. ○ Enforce and ensure compliance of the national environmental quality standards. ○ Initiate and evolve procedures and safeguards for the prevention of accidents which may cause environmental degradation and evolve remedial measures where accidents occur; ○ Undertake in co-operation with relevant key stakeholders' environmental education and public awareness;
	Ministry of lands, housing and human settlements development	○ Authority over the national land including the project area. ○ Enforce law and regulations in the area of influence of the project. ○ To develop and implement Policies on Education,
	Occupational Safety and Health Authority (OSHA)	○ Issuing certificates of compliance. ○ Designated Authority for occupational safety issues. ○ Registration of workplace.
Project Proponent	Mzumbe University (MU)	○ Project investment and project cycle implementation, monitoring and auditing; Conducting ESIA study and follow-up on ESIA certificate. ○ Land acquisition and payment of compensations. ○ Paying of applicable taxes and charges. ○ Project operation and decommissioning
Project Financier	World Bank	○ Project financing

Level	Institution	Role and responsibility
Regional Level	Tanga Region	○ Oversee and advice on implementation of national policies at regional level. ○ Oversee enforcement of laws and regulations. ○ Advice on implementation of development projects and activities at regional level.
Local Governments Authorities and Communities	Mkinga District Council	○ Oversee and advice on implementation of national policies at District level. ○ Oversee enforcement of laws and regulations. ○ Advice on implementation of development projects and activities at District level
	Ward Office and Village Office at MU-Tanga Campus	○ Project monitoring (as watchdogs for the environment, ensure the well-being of residents) and participate in project activities. ○ To extend administrative assistance and advice on the implementation of the project. ○ Managing the community's relation
	Local communities, NGOs, CSOs and FBOs	○ Project monitoring (as watchdogs) ○ Provides assistance and advice on the implementation of the project. ○ 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)
- Consultant
- Design Consultant
- Contractor

Table 3.6: Principal Participants in the Implementation of the Proposed Project

S/N	Institutions/ Position	Roles and responsibilities in HEET Project
1	**World Bank and GoT**	o Review sub-project screening including risk level categorization; o Review the ESIAs, ESMPs and site specific ESMPs; o Review quarterly reports by the implementing agencies; o Monitor compliance with the ESMF; and o Undertake implementation support missions.
2	**UPIU-MU**	o 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. o 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. o Coordinate preparation of ESIA and environmental and social management plans (ESMPs) done by consultant and site-specific ESMPs (SSESMP). o 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. o Ensure that contractors have an Environmental Health and Safety Officer (EHS), who are familiar with the compliance requirements, including WB EHS guidelines. o Review progress reports by the supervision engineer/consultant during civil works and conduct inspection of the sites. o 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. o 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**	o Receive ESIA/ESMP reports, review and provide recommendations for improvement and further guidance o Provide environmental permit where necessary upon receiving of ESIA / ESMP reports prepared by consultants on behalf of clients o 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.

		o 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)** o 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 o Assist the PIU to ensure that the necessary environmental, health and safety authorizations and permits have been obtained; o Maintain open and direct lines of communication between the PIU and contractor(s) with regard to environmental matters; o Review and approve the contractor's site-specific construction ESMPs (CESMP), Waste Management Plans together with the PIU; o 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; o 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; o Monitor the contractor's environmental awareness training program for all personnel working onsite; o 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)** o Facilitating dialogue between project stakeholders, including local communities, to address concerns and ensure their perspectives are considered. o Ensuring project activities adhere to Tanzanian regulations, policies, and World Bank standards related to social safeguards and community well-being. o Providing training and support to project staff and community members on social issues, grievance mechanisms, and community development initiatives. o Regularly monitoring project activities to assess their social impacts, effectiveness of mitigation measures, and compliance with agreed-upon standards and regulations. o 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. o Identifying and mitigating social risks associated with the project, such as conflicts with local communities, land acquisition issues, and cultural heritage preservation.

		o 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)** o Ensure that all construction activities adhere to World Bank Standards, Tanzanian regulations, and relevant policies and legislations concerning health and safety. o Regularly inspect construction sites to monitor compliance with safety standards and identify any deficiencies that need addressing. o Provide training to the contractor on the EHS requirements to be followed; o 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; o Monitor protocols for handling accidents or emergencies on construction sites from contractor, including immediate response procedures and post-incident investigations. o Monitor the contractor's environmental awareness training program for all personnel working onsite; o In case of any accidents or incidents, immediately notify the PIU and support the process of documenting and reporting the case to the WB; o Conduct thorough risk assessments of construction sites to identify potential hazards and develop mitigation strategies to prevent accidents and injuries. o 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. o Maintain comprehensive records of safety inspections, incident reports, and compliance documentation, and submit required reports to UPIU and project stakeholders. o 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**	o Understand the sub-project setting and site-specific requirements with discussions with the PIU; o Incorporate the issues identified in the ESIAs, ESMPS into the project design. o Provide cost estimates for implementing the design requirements.
6	**Contractor**	**a. Environmental Specialist (s)** o Compliance with relevant environmental and social legislative requirements (project-specific, district- and national level), including allocating adequate budget for implementation of these requirements; o Prepare CESMPs based on the ESMP in the bidding documents and contracts; o Work within the scope of contractual requirements and other tender conditions;

		o In case of non-compliances/discrepancies, carry out investigation and submit proposals on mitigation measures, and implement remedial measures to reduce environmental impact; o Propose and carry out corrective actions in order to minimize the environmental impacts; o Provide training to project personnel on environmental best practices and build capacity for effective environmental management. o Develop contingency plans and response protocols to address environmental emergencies or incidents that may arise during construction o Implement monitoring programs to track environmental parameters during construction activities; o Maintain accurate documentation of environmental compliance activities and ensure that all necessary permits and approvals are obtained. o Identify opportunities for improving environmental performance and implement measures to minimize negative impacts and enhance sustainability. o Send weekly reports of non-compliance to the Supervision Engineer/consultant; and o Send monthly progress reports to the Supervision Engineer/consultant. **b. Social specialist(s)** o Ensure adherence to World Bank Standards and Tanzanian regulations, policies, and legislation concerning social aspects of construction projects. o Developing mitigation strategies to address social risks and impacts. o Facilitate meaningful engagement with local communities, government agencies, NGOs, and other stakeholders affected by the project throughout the project lifecycle. o Monitoring project activities to ensure compliance with social safeguards. o Providing capacity building and training to project stakeholders on social issues. o Collaborating with relevant government agencies to ensure alignment with national policies and legislations. o Reporting on social performance and addressing grievances from affected communities. o Ensuring transparency and accountability in project implementation, promoting sustainable development goals. o 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)** o Prepare and implement the contractor's site-specific construction ESMPs (CESMP), Health and Safety Mangement Plan, Labour Management Plans and Traffic Management Plans.

		o 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. o 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. o Develop and implement emergency response plans to effectively manage accidents, injuries, or other emergencies that may arise during construction activities. o Carry out any corrective actions instructed by the Supervision Engineer/consultant; o Provide training to the labourers on the EHS requirements to be followed; o Monitoring and reporting covers details of fatalities, injuries, crash types, and locations. o Maintain comprehensive records of safety inspections, incidents, and corrective actions taken, and ensure timely reporting to relevant authorities as per regulatory requirements. o Foster a culture of safety among all project stakeholders, encouraging active participation and accountability for maintaining a safe work environment. o 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. o Continuously monitor and evaluate safety performance, identify areas for improvement, and implement measures to enhance safety standards throughout the project lifecycle.

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

The proposed establishment of WSP and Composting facility within the MU-Tanga campus will involve clearance of some secondary vegetations which are currently environmental conversation agent MU. The secondary vegetations to be cleared are grasses and few indigenous trees. This Environmental and Social Standard is applicable to this project due to potentially adverse environmental risks and impacts on the site and in the areas of influence. These include impacts on natural environment such as air, water, land, human, health and safety. Thus, MU shall analyze project activities and associated environmental and social risks and impacts the during construction phase.

The project has prepared an Environmental and Social Impact Assessment (ESIA) and/or Environmental and Social Management Plans (ESMPs). Therefore, the project components have been screened to determine potential adverse impacts and mitigation measures for their planned activities.

According to the social relation between MU and the nearby community, social services like, FGBP church, mosques, Rubawa primary school, Gombero dispensary, Gombero secondary school nearby the project area for the proposed establishment of MU-Tanga Campus can be pressurized due to the increase of student's enrolment and affected by construction activities during construction period.

3.8.2 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.

All works will be done in compliance with relevant environmental and health and safety standards to minimize impact on workers as well as the local area and citizens. The ESIA contains robust procedures for worker safety, requiring plans for accident prevention as well for health and safety of workers and communities, which are also part of contracts for civil works.

MU will ensure that the project contractors and sub-contractors operate under policy-led objectives that promote gender equality, non-discrimination and fair treatment in recruitment and employment, respect for national labor laws, including prohibiting child and forced labor, and combatting gender-based violence, in particular sexual harassment.

Contractors/subcontractors, primary suppliers and sub-contractors shall ensure equal employment opportunity and not discriminate anyone on the basis of color, nationality, tribe, social origin, political opinion, religion, gender, pregnancy, marital status/family responsibility, disability, HIV/AIDS, age or station of life, sexual orientation, or union membership.

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.

3.8.3 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 Tanga UWASA will be used throughout the project implementation. The area for proposed establishment of MU-Tanga campus has a total area of 121.70 HA. This implies that the project area for MU-Tanga campus p 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. Vegetation clearance will be limited to areas where land is required for construction of the facilities. 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.

3.8.4 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. During project execution the risks of Gender-Based Violence or Sexual Exploitation and Abuse of children, or communicable diseases, may arise from the interaction of project workers with local communities from Pangarawe area, Gombero, Vunde-Manyinyi, Jirihini, Kichangani and Dima villages. The project will ensure compliance with national law requirements regarding the COVID-19 situation. MU shall work closely with villages 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. Also, the proposed establishment of new buildings for M-Tanga campus should reflects the risk of adverse consequences posed by the nature and use of the structural elements, and the natural conditions of the area. Hence, takes into account the relevant engineering safety considerations, such as geotechnical, structural, electrical, and mechanical specification.

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.

3.8.5 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 followed 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.

Additionally, during stakeholder consultation the community member from Pangarawe area, Gombero, Vunde-Manyinyi, Jirihini, Kichangani and Dima Villages raised concern about the existence of big tunnels/Kichuguu within the project area. Also, the ESIA team confirmed this during site visit, hence the proponent (MU) will preserve and conserve this by creating garden nearby the tunnel to make it more attractive.

3.8.6 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 banks 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 provides the baseline environmental condition of the project area that makes a reference frame to mark out the potential environmental impacts that might arise during the implementation of the proposed project. The affected environment includes the social, economic, and biophysical environment that could be affected by, or could affect the project.

4.2 Biophysical Environment

4.2.1 Location and Geographical Settings

Mkinga District is bordered by Muheza and Tanga and the Indian Ocean to the East, the district is situated between Latitude -4.7952766 and Longitude 38.904164. The district has a total land area of 2,948 square kilometers situated at 192 meters above the mean sea level. Apart from the coastal low land which rises about 100 metres above sea level, the rest of the district rises gradually from the east toward the northern and mid-southern areas to about 400 metres above sea level. The proposed Mzumbe-Tanga project site is located at Gombero ward, lying at the border between Tanga city and Mkinga district council.

4.2.2 Climate

The site settles in Tanga a coastal region that has warm humid climate. In Tanga, the wet season is hot and mostly cloudy; the dry season is warm, windy, and mostly clear; and it is oppressive year-round. Over the course of the year, the temperature typically varies from 21°C to 32°C and is rarely below 20°C or above 33°C.

The impact of climate on this project is multifaceted, affecting both the operational efficiency and the environmental sustainability of the proposed facilities. Changes in temperature and precipitation patterns may influence the treatment efficiency of the wastewater stabilization pond, altering microbial activity and nutrient removal processes. Additionally, extreme weather events, such as floods or droughts, pose a risk to the stability and functionality of the pond and composting facility. Rising temperatures may also accelerate the composting process, potentially affecting the quality of the final product. Furthermore, the social aspects of the project, such as the availability of water resources for the facilities and the potential impacts on the local community, are intricately linked to climate variability.

i. Temperature

Pangarawe site experience the high and low temperature similar to the macro climate of Tanga. The hot season lasts for 3.0 months, from December 26 to March 27, with an average daily high temperature above 31°C. The hottest month of the year in Tanga is March, with an average high of 37°C and low of 25°C. The cool season lasts for 3.2 months, from June 4 to September 9, with an average daily high temperature below 28°C. The coldest month of the year in Tanga is August, with an average low of 21°C and high of 27°C (Source: Weather-and-climate.com, 2023).

The temperature plays a critical role in the biological processes involved in both wastewater treatment and composting. In WSP, microbial activity is essential for the breakdown of organic

matter, and temperature significantly influences the rate of these biological reactions. Warmer temperatures generally enhance microbial activity and accelerate the treatment process; however, colder temperatures can slow down or even inhibit these biological processes. Additionally, extreme temperatures may impact the stability of the treatment systems. Similarly, the composting facility will be sensitive to temperature fluctuations as the decomposition of organic materials is a microbial-driven process. Adequate temperatures are necessary to promote the growth of microorganisms responsible for breaking down organic matter into compost. Monitoring and managing temperature levels will be crucial to ensure the effectiveness of both the wastewater stabilization pond and composting facility in this environmental and social impact project. Adaptable designs and operational strategies may be needed to account for seasonal temperature variations in order to maintain optimal conditions for wastewater treatment and composting processes.

ii. Rainfall

Pangarawe as it is in Tanga experiences extreme seasonal variation in monthly rainfall. Rain falls throughout the year. The month with the most rain is April, with an average rainfall of 6.2 inches. The month with the least rain is August, with an average rainfall of 0.5 inches.

Precipitation patterns in Pangarawe follow a wet season from November to May, accounting for 6.4 months, and a drier season from May to November, spanning 5.6 months. April is the wettest month, while September is the driest. Sunlight remains relatively consistent throughout the year, with minor variations in the length of the day. The microclimatic conditions, including sea breezes and winds, contribute to a cooler environment during morning and evening hours. Despite small cliffs nearby, the area elevated position allows unobstructed airflow, influencing building orientation for natural ventilation and energy efficiency. The campus site falls within a dry zone, defined by contours between 1139.50m and 149.00m, with surface runoff collected by the Zigi seasonal stream that eventually flows into the ocean, shaping the site's hydrology (Source: Weather-and-climate.com, 2023).

Rainfall can significantly impact the efficiency and operation of the wastewater stabilization pond, as excessive rainfall may lead to an influx of water, potentially exceeding the system's design capacity. This overflow could compromise the treatment process and result in environmental contamination. On the other hand, optimal rainfall patterns could enhance the effectiveness of the composting facility by providing the necessary moisture for the composting process. However, excessive or poorly timed rainfall may hinder the composting process, affecting the quality of the end product.

iii. Humidity

We base the humidity comfort level on the dew point, as it determines whether perspiration will evaporate from the skin, thereby cooling the body. Lower dew points feel drier and higher dew points feel more humid. Unlike temperature, which typically varies significantly between night and day, dew point tends to change more slowly, so while the temperature may drop at night, a muggy day is typically followed by a muggy night. The perceived humidity level in Tanga, as measured by the percentage of time in which the humidity comfort level is muggy, oppressive, or miserable, does not vary significantly over the course of the year, staying within 3% of 97% throughout (Source: Weather-and-climate.com, 2023).

Humidity plays a crucial role in the performance of wastewater stabilization ponds, as it affects the rate of evaporation and the efficiency of the treatment process. High humidity can lead to slower evaporation rates, potentially affecting the overall treatment capacity of the WSP. Additionally, it may contribute to increased odors and the proliferation of insects, impacting the social aspects of the project by potentially causing discomfort to nearby communities. On the other hand, composting facilities rely on controlled levels of moisture for the decomposition of organic waste. Excessive humidity may lead to difficulties in maintaining optimal composting conditions, potentially resulting in suboptimal compost quality. Therefore, a comprehensive assessment of humidity levels and their potential fluctuations in the proposed location is crucial for the success of the wastewater stabilization pond and composting facility, ensuring their environmental sustainability and minimizing any negative social impacts on the surrounding communities.

iv. Wind

This section discusses the wide-area hourly average wind vector (speed and direction) at 10 meters above the ground. The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages. The average hourly wind speed in Tanga experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 5.2 months, from April 26 to October 1, with average wind speeds of more than 10.6 miles per hour. The windiest month of the year in Tanga is July, with an average hourly wind speed of 13.2 miles per hour. The calmer time of year lasts for 6.8 months, from October 1 to April 26. The calmest month of the year in Tanga is March, with an average hourly wind speed of 8.1 miles per hour (Source: Weather-and-climate.com, 2023).

The wind can play a crucial role in both positively and negatively impacting the environmental and social aspects of this project. On one hand, strong winds can enhance the aeration process in the wastewater stabilization pond, promoting the efficient breakdown of organic matter through aerobic decomposition. This natural aeration can contribute to the overall effectiveness of the wastewater treatment system. However, the wind can also pose challenges, especially for the composting facility. Uncontrolled wind may lead to the dispersion of composting materials, causing air pollution and potential health hazards for nearby communities. To mitigate these effects, proper windbreaks and containment measures must be implemented in the composting facility design. Additionally, the consultancy for designing should consider the local wind patterns to optimize the layout and operation of both the WSP and composting facility, ensuring minimal negative consequences and maximum effectiveness in waste management.

4.2.3 Soil

Pangarawe area has soil of different strata, the top layer being a mixture of sand and loam soil while clay soil is found within three meter deep. This is an indicative that there is no limitation of foundation types for the buildings. The site has natural vegetation dominated by shrubs with thorns, few cactuses as well as short trees. This implies that landscape design should respect natural vegetation and enhance the use of plants related to the context (Mzumbe University Tanga Campus Masterplan 2023-2043).

The soil quality in the proposed area plays a pivotal role in determining the success and efficiency of the WSP and composting facility. Proper soil characteristics, such as permeability and

composition, are crucial for the effective treatment of wastewater in the stabilization pond. Additionally, the composting facility's success is contingent upon the soil's ability to support the decomposition and transformation of organic matter. Conversely, the establishment of these facilities may also impact the soil quality. Effluent from the stabilization pond, if not managed appropriately, has the potential to introduce contaminants into the soil, affecting its fertility and overall health.

4.2.4 Topography

The terrain morphology of MU-Tanga campus is characterised by flat land with some few moderate anthill and fewer rainfall ditches. Based on topographical data capturing, the area is gently elevated towards the northern side with little slope on the northwestern side.

The topographical features of the proposed site play a crucial role in determining the feasibility and effectiveness of the wastewater treatment and composting processes. The terrain can significantly affect the layout and design of the stabilization pond system, influencing factors such as water flow, pond depth, and overall system efficiency. Additionally, the topography can impact the composting facility placement and design, considering factors such as drainage, accessibility, and potential environmental risks. A thorough environmental and social impact assessment must address these topographical considerations to ensure the sustainable and harmonious integration of the wastewater stabilization pond and composting facility into the landscape. This assessment should account for potential effects on the local ecosystem, groundwater, and nearby communities, aiming to minimize adverse impacts and promote the long-term success of the project**.**

4.2.6 Catchment and Hydrology

The Campus site, as it is for the whole Mkinga District, is located within the inland areas from the coastal reefs. The Zigi seasonal stream collects surface runoff from the site to the ocean. The primary runoff flow during the rainy season moves from Southeast to Northwest of the site. The site is within a dry zone, the campus site is between contours 1139.50m and 149.00m.

The catchment, which represents the area contributing runoff to the proposed facility, plays a crucial role in determining the quantity and quality of water that will enter the system.

The hydrological characteristics of the site, such as rainfall patterns and surface water flow, must be comprehensively assessed to ensure the effective functioning of the WSP. Changes in land use and the creation of impervious surfaces associated with the project could influence surface runoff and potentially impact the pond's hydraulic retention time and treatment efficiency. Additionally, understanding the hydrological cycle is vital for predicting potential environmental impacts, including the risk of flooding or the alteration of local watercourses. Moreover, the project's establishment will inevitably influence the catchment, as the wastewater stabilization pond and composting facility could alter the natural flow of water and nutrient dynamics in the area. Proper consideration of catchment and hydrology in the ESIS is paramount for designing and implementing effective measures to mitigate potential adverse effects on the environment and social aspects of the region, ensuring the sustainability and success of the proposed wastewater treatment and composting initiatives.

4.2.7 Existing Land Uses in the Project Area

The current land-use of the MU-Tanga campus is shrub land that has no built structures, and agricultural activities. The site does not have defined pathways for accessibility. According to the

title deed, the planned area has a total area of 121.70 HA out of which about 10,000m^2 will be used by the project.

4.3 The Biological Environmental

The ESS6 addresses all habitats, categorized as 'modified habitat', 'natural habitat', and 'critical habitat', along with 'legally protected and internationally and regionally recognized areas of biodiversity value' which may encompass habitat in any or all of these categories. Terrestrial and aquatic habitat in the project area for the proposed establishment of MU-Tanga campus at Pangarawe area will be categorized as Modified habitat in accordance with the methodology and requirement of IFC NP6/ ESS6 defined as follows:

Modified habitat; are areas that may contain a large proportion of alien animal and/or plant species and/or where human activity has significantly altered the primary ecological functions and species composition.

4.3.1 Flora and Fauna

The proposed area for project implementation has a variety of plants species including indigenous trees which are short trees, shrubs with thorns, lawn & few cactuses were observed. Other trees within the project area it includes but not limited to the following; *Vachellia seyal* (Shittimwood), *Ehretia amoena* (Sandpaper bush), *Euphorbia murielii* (Candelabra tree), *Carissa spinarum* (Egyptian carissa), *Aloe secundiflora* (African Aloe), *Ochna serrulate* (Small-leaved plane), *Hyphaene coriacea* (Doum palm), *Grewia kakothamnos, Chamaerops humilis*_(European fan palm), Also, 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. The construction and development activities associated with the project may not lead to habitat disruption and fragmentation, potentially displacing or disrupting the natural environment of various plant species. The increased human presence and infrastructure may result in changes to the local ecosystem, affecting environmental and potentially leading to environmental degradation.

4.3.2 Unique and Endangered species

There are neither unique nor endangered species of concern that were observed during site assessment.

4.4 Baseline Measurement

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 Ambient Air Quality, Noise and Vibrations

The ambient air quality was monitored in the impact area as per air quality monitoring guidelines. Sampling location was selected regarding the persons living within the project area and the surrounded community in order to assess the impact associated with the proposed establishment. 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 (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 with manufacturer procedure and applicable local standards and/or international environmental guidelines. 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).

4.4.1.3 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 with ISO 1996-1:2003 using a Digital Sound Level Meter. 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).

4.5 Socio-Economic Environment

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

4.5.1 Population

During the 2022 national census, Mkinga District had a total population of 146,802 with 73,048 males and 73,754 females (Table 4.1). The 2022 National Population Census reveals that Gombero ward had a population of 6,292, consisting of 3,146 males and 3,146 females, with a population growth rate of 2.1 percent. In the same year, the population distribution among the five sub-wards of Gombero Ward is detailed in table below, and social facilities supporting this population are depicted in the table below (Source: NBS, 2022).

4.5.2 Cultural Heritage, Aspirations, Traditions and Religion

In Mkinga District, the predominant ethnic groups are the Zigua, Segeju, Sambaa, Bondei, Digo, and Sambaa. Additionally, Swahili is the official language of Tanzania and is commonly used in Mkinga District. Other languages spoken in the district include Zigua, Sambaa, and Bondei. In terms of religion, the majority of the population adheres to Islam, with a notable Christian minority. The cultural heritage of the local communities in Pangarawe, Gombero, Vunde-Manyinyi, Jirihini, Kichangani, and Dima villages may be significantly impacted by the introduction of modern wastewater treatment infrastructure.

Traditions and religious beliefs often play a pivotal role in shaping community practices and attitudes towards development projects. The establishment of a wastewater stabilization pond and composting facility may conflict with, or challenge traditional practices related to land use and resource management. Additionally, the perception of the project within the context of religious beliefs could influence community support or opposition. It is crucial to engage with local religious leaders and integrate traditional knowledge to ensure that the project aligns with the values of the communities involved. Also, residents from Pangarawe area, Gombero, Vunde-Manyinyi, Jirihini, Kichangani, and Dima villages should be actively involved in the decision-making process. Public consultations and awareness programs should be conducted to gather insights into the concerns and aspirations of the local population.

4.5.3 Health Services

Mkinga district has three types of healthcare facilities: one (1) newly constructed district hospital located in Parungu Kasera (the district capital of the Mkinga District), three (3) health centres, and forty-two (42) dispensaries. Gombero ward hosts one of these dispensaries, with plans for additional construction. Given the distance between MU-Tanga campus and Parungu Kasera, relying on the district hospital facility may be challenging because it is costly and timely to get to the hospital as it is located an estimated 18km away. In addition, the Gombero ward dispensary is small and has limited medical facilities and personnel therefore, it is crucial for MU-Tanga Campus to establish healthcare facilities that will ensure access to healthcare services for both MU students, staff and the local from Pangarawe area and its nearby areas like Gombero, Vunde-Manyinyi, Jirihini, Kichangani and Dima villages.

On one hand, the implementation of the wastewater stabilization pond and composting facility is likely to enhance environmental sustainability by treating and managing wastewater and organic waste. This could lead to a reduction in waterborne diseases and environmental contamination, thus positively influencing the overall health of the community. However, during the construction and operational phases, there may be temporary disruptions, exposure to construction-related hazards, and potential air or water quality concerns that could pose health risks to the residents. To mitigate these potential health impacts, a comprehensive health services plan should be integrated into the project. This plan could include regular health check-ups for the construction and facility operation staff, as well as awareness campaigns for the local residents regarding potential health risks and preventive measures. Additionally, it is crucial to establish a responsive healthcare infrastructure that can address any emergent health issues during and after the project implementation.

For residents in Pangarawe area, Gombero, Vunde-Manyinyi, Jirihini, Kichangani, and Dima villages, their health may be directly influenced by the success and proper management of the wastewater stabilization pond and composting facility. Adequate waste management can reduce the prevalence of waterborne diseases, creating a healthier living environment. However, community engagement is crucial to address any concerns and ensure that the project aligns with the needs and priorities of the local population.

4.5.4 Education

As of 2022, Mkinga District had a total of 94 schools, with 79 being primary schools and 15 being secondary schools and 1 vocational training centre (VETA). The primary education department includes 76 primary schools with a combined student population of 28,254, comprising 14,258

boys and 13,996 girls in grades I through VII. The district's enrolment status for Standard I meets the national requirement, ensuring that all school-age children are enrolled.

Across the district's 21 wards, there are a total of 15 secondary schools. One of these fifteen secondary schools is located in Gombero ward, and all educational facilities are government-owned, with no private institutions currently in operation. The presence of just one vocational training centre indicates an imbalance in secondary education, limiting the opportunities for secondary graduates to pursue college education. The secondary school in Gombero ward serves several surrounding villages, including Pangarawe, Gombero, Vunde-Manyinyi, Jirihini, Kichangani and Dima villages.

Education plays a pivotal role in both influencing and being influenced by this project. Firstly, educational programs must be implemented to raise awareness about the environmental and social impacts of wastewater treatment and composting. This includes educating the local community, project stakeholders, and campus residents about the benefits of the proposed facility in promoting sustainable practices and mitigating environmental pollution. Additionally, educational institutions, particularly Mzumbe-Tanga Campus, can serve as hubs for research and innovation in wastewater management and composting technologies, contributing to the overall success and efficiency of the project.

On the other hand, the establishment of the wastewater stabilization pond and composting facility will also have direct implications for education. The project may lead to the development of academic programs, courses, and research opportunities related to environmental science, engineering, and sustainable development, thereby enriching the educational landscape of the MU-Tanga Campus. Also, regarding the impact on residents from Pangarawe area, Gombero, Vunde-Manyinyi, Jirihini, Kichangani, and Dima villages, education becomes a crucial tool for community engagement and participation. Local residents need to be educated on the purpose and benefits of the wastewater stabilization pond and composting facility. Public awareness campaigns, workshops, and information sessions should be conducted to address any concerns, dispel misconceptions, and ensure the active involvement of the community in the decision-making process. This educational outreach is vital for fostering a sense of ownership and responsibility among the residents, making them partners in the success of the project. Furthermore, education can empower the local population with the knowledge and skills necessary for the sustainable management of the facilities, ensuring their long-term viability and positive impact on the surrounding environment and communities.

4.5.5 Employment

a. Agriculture

The agriculture sector employs over 80% of the population in Mkinga District, while approximately 20% are engaged in minor activities such as livestock farming, fishing, and small-scale agribusiness. 85% (250,580 hectares) of Mkinga district’s land area is suitable for crop cultivation and livestock rearing. Food crops like maize, cassava, beans, legumes, and bananas are grown, along with cash crops such as cashew nuts, coconuts, groundnuts, oranges, mangoes, spices, and sisal in larger plantations. However, out of the 250,580 hectares of arable land, only 75,574 hectares, or 30%, are currently cultivated for both cash and food crops. Also, livestock keeping is common in Gombero ward, including cattle, goats, and sheep.

Therefore, the agriculture sector is likely to be impacted by this project due to changes in water usage, nutrient runoff, and potential contamination of surrounding soils. The wastewater

stabilization pond, designed to treat and manage sewage, may affect water availability for nearby agricultural activities. Additionally, if improperly managed, the effluents from the WSP could introduce contaminants into the environment, potentially affecting crops and the overall ecosystem. On the positive side, the composting facility can contribute to sustainable agriculture by producing organic fertilizer. However, if not properly regulated, the composting process may release odors or pollutants that could adversely impact nearby agricultural practices.

The local residents of Pangarawe area, Gombero, Vunde-Manyinyi, Jirihini, Kichangani, and Dima villages are likely to be directly affected by the establishment of the wastewater stabilization pond and composting facility. The project could alter their access to water resources, potentially impacting agricultural irrigation and livestock needs. Moreover, if the wastewater treatment process is not effectively managed, it might lead to water contamination, posing risks to both human health and agricultural activities. The odor and emissions from the composting facility could also affect the well-being and living conditions of the nearby communities, potentially influencing their overall quality of life and the desirability of residing in these areas. To ensure a positive outcome, it is crucial to engage with the local residents, conducting thorough consultations, and implementing measures to mitigate potential adverse effects on agriculture and the well-being of the communities in Pangarawe, Gombero, and surrounding villages.

b. Fisheries

Mkinga district, nestled near the ocean on the east, thrives with approximately 21 fishing communities engaged in diverse economic activities such as salt mining, seaweed cultivation, fishing (both industrial and subsistence), aquaculture, and collection of ornamental and medicinal fisheries products. Despite these opportunities, fishermen encounter challenges due to limited fishing zones within 20 kilometers from the coastline, resulting in meager incomes due to inadequate equipment and vessels.

Introducing a wastewater treatment plant (WSP) and composting facility could potentially impact fisheries by altering water quality and habitat, affecting fish populations and local livelihoods. However, proper management of these facilities could mitigate environmental pollution, indirectly benefiting fisheries. The project's evaluation must prioritize the perspectives and well-being of residents in villages like Pangarawe, Gombero, Vunde-Manyinyi, Jirihini, Kichangani, and Dima, as they could be directly affected by changes in air and water quality and disruptions to their fisheries-dependent livelihoods.

4.5.6 Water supply

Mkinga District enjoys numerous sources of water, including permanent rivers like Umba, Msambiazi, and Zigi, as well as permanent water sources like Kinyatu. There are also areas suitable for constructing dams. The district experiences two annual rainy seasons, allowing for rainwater harvesting and use during the dry season. Properly harnessing these opportunities can significantly alleviate water shortages in the district. The water sector in Mkinga District faces significant challenges related to the shortage of clean and safe water in various parts of the district. These issues arise due to several factors, including the aging water infrastructure in places like Maramba, Bwiti-Mavovo, Daluni Kisiwani, Mkinga, Moa, and Duga Maforoni, resulting from inadequate maintenance caused by financial constraints. The scarcity of safe water is also linked to the high cost of constructing water facilities, limited citizen participation in funding water projects, and insufficient government contributions.

Additionally, the project success hinges on a reliable and sustainable water source for its operations, particularly for the functioning of the WSP. Adequate water supply is crucial for the treatment and stabilization of wastewater in the pond, ensuring the facility effectiveness in managing and treating sewage. As for the impact on residents in Pangarawe Area, Gombero, Vunde-Manyinyi, Jirihini, Kichangani, and Dima villages, the establishment of the wastewater stabilization pond and composting facility could have both positive and negative consequences. On the positive side, the project promises improved sanitation and waste management, reducing the environmental impact of untreated sewage. This could lead to a healthier living environment and a decrease in waterborne diseases. However, the potential strain on the local water supply due to the facility's operations could pose challenges for the surrounding communities. Increased demand for water might result in water scarcity for residents, affecting their daily activities and agricultural practices. Additionally, there could be concerns about potential contamination of local water sources if the wastewater treatment process is not adequately managed.

CHAPTER 5: STAKEHOLDERS ENGAGEMENT PLAN 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 WSP at MU-Tanga Campus 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 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 projects impacts and mitigation measures. The project will consider and respond to these inputs during ESIA process. Furthermore, the engagement activities enable 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 organizations 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 at Gombero ward, Gombero village in Pangarawe area. 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.

Also, 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 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, Gombero Ward Executive Officer (WEO),

Gombero, Vunde-Manyinyi, Jirihini, Kichangani and Dima Village officials were consulted. In addition to that, interview was held with the health and safety inspectors at Occupation Health and Safety Authority (OSHA), Fire and Rescue Force office, Rural Water Supply and Sanitation Agency (RUWASA), Tanga UWASA, 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
Tanga Regional Administrative Secretary	Political and administrative issues	**HIGH**
Mkinga District Council	Overall advice on both professional works (land, Planning, environments, social, economics) with regards to the execution of the project at MU-Tanga 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-Tanga Campus and the surrounding communities of Gombero 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**
Gombero Ward (Gombero, Vunde-Manyinyi, Jirihini, Kichangani and Dima Village)	Beneficiaries of the MU-Tanga Campus in Tanga 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), it's 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).

5.5 Stakeholders Consultation and Disclosure Methodologies

Various communication techniques were 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.

5.5.4 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.

5.5.5 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.

5.5.6 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.

5.5.7 Field Assessment

This entailed conducting systematic evaluations both within and in the vicinity of the proposed development locations. All findings were meticulously examined and recorded. Additionally, the report delves into expert insights and technical approaches relevant to the issues at hand. To comprehensively understand the current state of the site, the assessment encompassed the physical and environmental aspects of the proposed development and the potential effects on surrounding areas, such as land usage, waste management, drainage systems, and assessment of pertinent socio-economic factors.

5.6 Concerns of Stakeholders

Generally, stakeholders view the proposed project as important for the socio-economic development of the area and the nation at large. However, they recommended the following to the proponent (Table 5.2);

Table 5.2; Details of Stakeholders concerns (Source; Consultation with stakeholders on August 2023)

Level	Institution/ Group	Views and Concerns of Stakeholders	Response to Concerns
National Level	**Tanzania Commission of Universities (TCU)**	The Consultant met with Head Procurement Management Unit under the Tanzania Commission of Universities (TCU). They had the following comments; o The contractor should deploy dust suppression and mitigation measures such as regular sprinkling of water to minimize dust pollution. o Construction of WSP and their design should follow design requirement for WSP. o The proponent should take into account issues of waste management for both solid, liquid and hazardous waste in project phases.	o The design group will need to incorporate and revise all the addressed 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. o The soil suitability should be assessed through a soil analysis as detailed in the Geotechnical report.
Regional Level	**OSHA**	The Consultant met with **General Inspector and Hygiene Inspector** who gave his comments and integrating health and safety issues within the life cycle of the proposed project. The focus should be but not limited to the following; o The proponent and contractor should make sure the project is registered under the Workplace Information Management System (WIMS) before pre- construction and construction phases. o The proponent should make sure that the awarded Contractor should have registered HSE representatives and First Aiders at all project phases, as well as First Aid Kits with all necessary facilities. Medical examination should be done to all workers before and after construction and operation phases as well as during operation	o MU and Contractor shall register the proposed establishment of new buildings at OSHA. o MU and Contractor shall ensure that HSE representatives and trained first aiders are in place for the proposed development. o Medical check-ups (Pre and Post medical) for the new employee and laboures will be done and workers shall be tested their health as per OSHA regulations. o Contractor shall conduct risk assessment and shall have accident book. o MU and contractor shall have health and safety management plan to ensure safety of workers within the project area. And the first aid kits shall be provided in an area where it will be easily visible and accessible.

Level	Institution/ Group	Views and Concerns of Stakeholders	Response to Concerns
		phase. o The proponent and contractor should conduct Risk Assessment before construction and prepare a Risk Assessment report. o The contractor should have accident book for the workers in order to keep accident records for those workers who had accidents during construction period. o The proponent and contractor 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 workplace. o The contractor should provide sufficient Personal protective equipment's (PPE) to all workers at the site and enforce them to use it all the time at the project site. o Contractor should provide Induction training to workers on health and safety and the appreciation of safety gear will be done. 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 proponent should ensure temporally, or portable toilet are in place within the project site. o The site area should have a provision of changing room.	o Personal Protective Equipment (PPE) must be supplied to all workers due to the inherent nature of construction tasks and the associated hazards. o MU and contractor should explain the nature of the project to the surrounded community and people living within the project area. o Contractor shall construct and design area for workers to change the clothes and other stuff during project implementation. o Contractor shall establish temporally toilets at the proposed site during construction period. o Contractor shall construct and design area for workers to change the clothes and other stuff during project implementation. o MU and contractor shall have health and safety management plan to ensure safety of workers within the project area.
Local Level	Mkinga District Council (DED, Environmental Management Officer, Land Planning Officer, Community Development Officer)	o Clearance should be done only on the proposed establishment areas in order to minimize cutting of trees and other vegetation. o Ensure the proposed WSP are managed well to avoid potential health risks and odors associated with the WSP process.	o Clearance shall be done for the proposed development area. o MU will manage wastewater from proposed development through the WSP which will be established. o MU and contractor shall ensure health and safety during and after construction period.

Level	Institution/ Group	Views and Concerns of Stakeholders	Response to Concerns
		○ Insist on health and safety of workers during and after the construction period so as to prohibit the complaints from the community after project implementation. ○ Employment priority should be given to the local community surrounding the project for both skilled and unskilled labour. ○ Also, they talked about the gender issue that during the construction period women should participate in all aspects as long they accept what they assigned by a contractor ○ During construction period safety issue must be enhanced and health education e.g., AIDS and malaria. ○ The proponent and contractor should rise awareness on transmission diseases like HIV/AIDS, COVID19 during project implementation. ○ During project implementation the proponent and contractor should enhance culture and custom of people from Pangarawe area in Gombero ward. ○ Contractor should not employ child during construction period. ○ Sensitization and trainings on finance management should be given to labourers.	○ The proponent shall conduct regular water quality monitoring to ensure the ponds are functioning as intended. ○ The proponent and contractor shall provide employment for local residents for both skilled and unskilled labourers. ○ MU-Tanga Campus shall provide modern and quality education for people from different area. ○ The contractor shall consider gender balance in provision of employment during construction phase. ○ The proponent shall build good relationship with the surrounded community. ○ The contractor shall provide and enhance health education e.g. HIV&AIDS and COVID19. ○ Contractor and proponent shall enhance culture and custom of people from Gombero area. ○ Child labour shall be avoided. ○ Contractor shall provide trainings on finance management to labourers during demobilization and decommissioning of the project.
	DMO-Mkinga	○ The proponent and contractor should associate with DMO-Mkinga in order to raise awareness on transmission diseases like HIV/AIDS, COVID19 during project implementation. ○ MU and Contractor should conduct orientation to their workers on common GBV/SH/SEA issues ○ MU and Contractor should enhance transparency with their workers within the project area.	○ The contractor shall collaborate with DMO-Mkinga to provide and enhance health education e.g. HIV&AIDS and COVID19. ○ MU and Contractor shall conduct orientation in every day. ○ MU and Contractor shall enhance transparency with their workers within the project area.

Level	Institution/ Group	Views and Concerns of Stakeholders	Response to Concerns
	RUWASA	○ The proponent should select water source as the main water supply for the proposed campus area includes rivers (Zigi river), ground water and rainwater harvesting.	○ MU shall use water from Zigi river through Tanga UWASA. However, ground water and rainwater harvesting as alternative water source.
	Ward Office-Gombero ward and Village office (ward Executive Officer, Village Executive Officers, chairmen, and community members)	The consultant convened a meeting with the Executive Officer of the ward, along with Executive Officers of the surrounding villages, including Pangarawe, Gombero, Vunde manyinyi, Jirihini, Kichangani and Dima villages, as well as community members from these villages, to discuss the proposed developments of MU-Tanga Campus at Pangarawe area. The recommendations that emerged from this meeting are as follow; ○ The project is worth being undertaken and accepted. ○ Water should be supplied to proposed MU-Tanga campus and the surrounded community to minimize water problems and sustains lives of people from Gombero ward. ○ MU should give area to food vendors (Mama lishe and Baba lishe) to conduct their services during project implementation. ○ Contractor should put road sign and consider speed limit for all roads that will be used for transportation of raw materials to prevent accidents because the proposed area for proposed campus is close to primary school. ○ Employment priority should be given to the local community surrounding the project for both skilled and unskilled labour. ○ The community requested a temporary dispensary to be established to provide first aids for those who will get injured within the project area during the construction period.	○ Tanga UWASA shall provide and supply water to MU-Tanga Campus and the surrounded community. ○ The land for proposed establishment is owned by MU based on title deed attached on appendix 3 ○ MU shall give temporary areas for food vendors from Gombero to run their services in simple way. ○ MU and contractor shall construct and establish passable road during project execution. ○ Contractor shall put road sign and will be aware with speed limit for all drivers during project implementation. ○ The proponent and contractor shall provide employment for local residents for both skilled and unskilled labourers. ○ MU shall establish dispensary within the proposed campus to ensure health of the students and the surrounded community. ○ The proponent and contractor shall ensure proper management of waste during project implementation.

Level	Institution/ Group	Views and Concerns of Stakeholders	Response to Concerns
		○ The proponent and contractor should ensure proper management of any kind type of waste generated during project implementation in all phases.	

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 (Table 5.3).

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 5.3: ***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 government (Mkinga District Council, Gombero Ward, Gombero, Vunde-Manyinyi, Jirihini, Kichangani and Dima Village)	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, TANGA UWASA, Mkinga District Council)	External	Comply with regulations and obtain necessary permits.	Project registration. Permit application process. Regular updates	Mobilization phase	○ Timely approval of permits, adherence to regulations
Environmental Agencies (Division of Environment, and NEMC)	External	Minimize Environmental and Social Impact	Environmental and Social Impact Assessment, consultation sessions	Mobilization phase	○ Mitigation measure for Environmental concerns. ○ Compliance with regulation
Donors/Funding Agencies (World Bank)	External	Accountability and transparency in fund utilization	Reporting mechanisms. Project presentations	Throughout project duration	○ Clear financial reporting, alignment with World Bank requirement.

5.8 Grievance Redress Mechanism

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.

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.

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 Mkinga 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 regard to the planned construction of the Academic building and other infrastructure in MU, Gombero ward, Mkinga 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

For construction activities the grievances will be handled at MU through the appointed Grievance Handling Officers (GHOs). The GRM will include the following steps:

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 (Appendix 5) 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.

- **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 in table 5.4;

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: ASSESSMENT OF IMPACTS AND IDENTIFICATION OF PROJECT ALTERNATIVE

6.1 Introduction

This chapter 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 utilization 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:

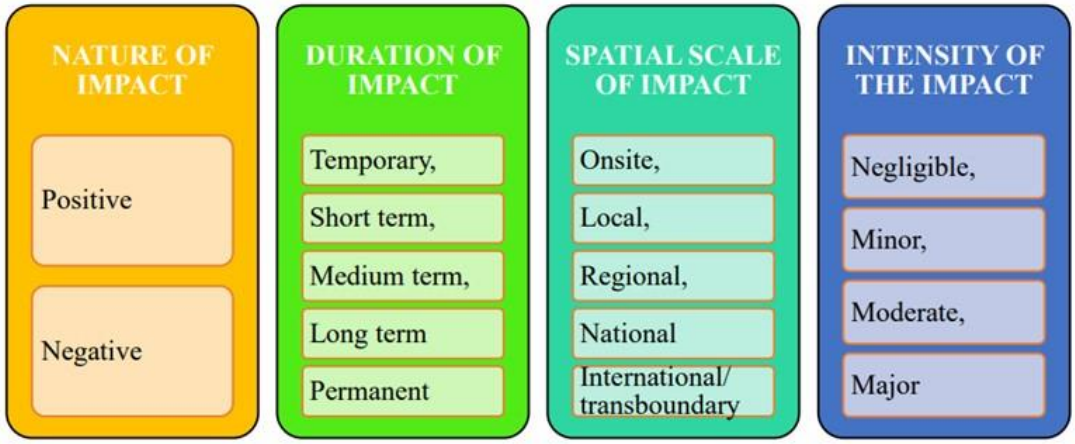

Figure 6.1: Impacts Identification (Source: 3Es Consultant, 2023)

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 optimizing are equally difficult, expensive and time consuming (or a combination of these), as achieving them in this way.
Slight	**Slightly beneficial**

Negative Impacts	Positive Impacts
Medium- to short term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	A short- to medium-term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimizing 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, optimization refers to any approach that can enhance those benefit. Both mitigation and optimization 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 Gombero ward within Mkinga District Council.
Regional	The impacts will be of such a nature that it may affect the Tanga city.
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 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	These impacts will usually result in long-term effects on the natural and/or social 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	These impacts will usually result in medium to long term effects on the natural and/or social 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	These impacts will usually result in medium to short term effects on the natural and/or social 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 organizations.
Negligible	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 organizations.

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 skills and impart knowledge to local communities	The impact is direct, indirectly, and inducive	**0**	**+3**	**0**	**+3**	**0**
3	Business opportunities in supply of materials and utilities	The impact is direct, indirectly, inducive, cumulative and reversible	**+2**	**+2**	**0**	**+3**	**0**
4	Influx of people/labour	The impact is direct, indirectly, and inducive	**0**	**-3**	**0**	**-1**	**0**
5	Occupations Health and Safety Impacts	The impact is direct, indirectly, and inducive	**0**	**-3**	**-1**	**-2**	**-2**
6	Community Health, Safety and Security impacts	The impact is direct, indirectly, reversible, cumulative and inducive	**0**	**-3**	**-1**	**-2**	**-2**
7	Disruption of Economic and Social Activities	The impact is direct, inducive, cumulative and reversible	**-2**	**-2**	**0**	**-2**	**-2**
8	Prevalence of Communicable diseases	The impact is direct, indirectly, inducive, cumulative and partially reversible	**-1**	**-2**	**0**	**+2**	**0**
9	Traffic Congestion	The impact is direct, reversible, cumulative and inducive	**-1**	**-2**	**0**	**-2**	**-1**
10	Conflicts and grievances	The impact is direct, indirectly, and inducive	**0**	**-2**	**0**	**0**	**0**
11	Impact on gender during employment	The impact is direct, indirectly, partially reversible, cumulative and inducive	**-1**	**-3**	**0**	**-2**	**0**
12	Reduced Traffic and Congestion	The impact is indirectly and inducive	**0**	**-2**	**0**	**0**	**-1**

S/N	Identified Impacts	Description of Impacts	Mobilization phase	Construction Phase	Demobilization Phase	Operation Phase	Decommissioning Phase
13	Child labor	The impact is direct, indirectly, and inducive	0	-3	0	0	0
14	Improved Health and Safety of the community members close to the project area	The impact is direct, indirectly, cumulative, reversible and inducive	0	0	0	+3	+3
15	Educational Opportunities	The impact is direct, indirectly, and inducive	0	0	0	+3	0
16	Improved Water Quality	The impact is direct, indirectly, and inducive	0	-2	0	-2	0
17	Loss of employment and business opportunities	The impact is direct, indirectly, inducive, and reversible	0	0	0	0	-3
18	Loss of Community Assets	The impact is direct, indirectly, inducive, and reversible	0	0	-3	0	-2
Environmental Impacts							
19	Improved Water Quality	The impact is direct, inducive and reversible	0	+1	0	+2	+3
20	Improved Aesthetics	The impact is direct, indirectly, inducive and irreversible		+1	0	0	+2
21	Loss of vegetation and other natural resources (Energy and water)	The impact is direct, indirectly, inducive and irreversible	-2	-2	0	0	0
22	Impairment of air quality due to dust and gases emission	The impact is direct, indirectly, inducive, and reversible	0	-2	-2	0	-2
23	Contribution to Climate Changes	The impact is direct, indirectly, inducive, and reversible	0	-1	0	0	-1
24	Foul smell (Odor)	The impact is direct, indirectly, inducive, and reversible	0	0	0	-2	-1
25	Mosquitoes breeding	The impact is direct, indirectly, inducive, and reversible				-2	-1
26	Increased Noise and Vibration level	The impact is direct, indirectly, inducive, and reversible	-2	-2	0	-2	-2
27	Improved Sanitation		0	-3	0	-3	+3

S/N	Identified Impacts	Description of Impacts	Mobilization phase	Construction Phase	Demobilization Phase	Operation Phase	Decommissioning Phase
28	Increase soil fertility due to the generation of natural fertilizer	The impact is direct, indirectly, inducive, and reversible					
29	Generation of solid and hazardous wastes	The impact is direct, indirectly, inducive, and reversible	0	-3	0	-3	-2
30	Generation of liquid waste	The impact is direct, indirectly, inducive, and reversible	0	-3	0	-3	-2
31	Soil Erosion and Pollution	The impact is direct, indirectly, inducive, and reversible	-1	-2	0	0	-2
32	Loss of visual Aesthetics	The impact is direct, indirectly, inducive, and reversible	0	-2	0	-1	-2
33	Increased water pollution	The impact is direct, indirectly, inducive, and reversible & irreversible	0	0	0	-3	-3
34	Overflowing of sludge into the surrounding environment	The impact is direct, inducive, and reversible	0	0	0	-2	0
35	Release of Contaminants	The impact is direct, indirectly, inducive, and reversible	0	0	-1	-2	-2
36	Loss of aesthetic value	The impact is direct, indirectly, inducive, and reversible	0	0	0	0	-2
37	Reduced Soil Contamination	The impact is direct, indirectly, inducive, and reversible	0	+2	0	+2	+1

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 Mobilization Phase

During this stage, activities included conducting topographic surveys, choosing suitable sites, performing geotechnical studies, pinpointing sources of natural construction materials like gravel, building sand, aggregates, and water, as well as transporting construction machinery to the site. It's important to note that as of the completion of this ESIA report, the planning and design phase will be concluded in the final ESIA report. Any potential positive or negative effects from this phase have been minimal and are no longer under examination**.**

6.4 Possible Potential Impacts during Construction Phase

Assessment of the possible impact that are likely to be caused by the proposed project was based on different activities that will be conducted during construction phase. These activities are;

- Earthworks (site clearance and removal of topsoil).
- Material transportation and storage.
- Abstraction and transportation of water to the construction site.
- Collection, storage, transportation, treatment, and disposal of wastes generated from construction activities.
- Actual construction works.
- Landscaping and environmental restoration and

In the course of construction, the following positive and negative impacts are anticipated;

A. POSITIVE SOCIAL IMPACTS

6.4.1 Job creation and employments opportunities

The project will generate employment opportunities for local residents, including residents from Pangarawe and inhabitants of Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages. This positive impact is direct, localized, and short-term, providing immediate economic benefits to the surrounding communities. The influx of job opportunities during the construction phase is expected to alleviate unemployment, enhance skills, and contribute to the socioeconomic development of the region.

From an environmental and social perspective, the project's impact is primarily indirect, moderate, and reversible during the Construction phase. The establishment of the wastewater stabilization pond and composting facility aims to improve environmental sustainability by managing and treating wastewater effectively. However, the project's influence on the local population is indirect, as its main focus is on environmental remediation rather than direct social engagement. The effects are moderate, as they are limited to the immediate vicinity of the construction site and do not extend regionally or nationally. The impact is reversible, meaning that upon completion of the construction, the environmental conditions can be restored to their pre-project state. Overall, the social and environmental impact during the Construction phase is deemed significant for the local communities, but it is localized, short-term, and reversible.

6.4.2 Increased skills and impart knowledge to local communities.

This impact will be manifested through increased employment opportunities, as local residents are likely to be engaged in the construction process and acquire new skills related to wastewater management and infrastructure development. Students from Rubawa Primary School, as well as residents from Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages,

will benefit from educational and training programs associated with the project, fostering a better understanding of environmental sustainability.

The impact on the communities can be considered direct, localized, and short-term during the construction phase. The skills acquired by locals, especially students, are likely to contribute to their personal development and potentially open up future employment opportunities. However, it is reversible once the construction phase is completed, and the long-term impact depends on the sustained utilization and maintenance of the wastewater stabilization pond and composting facility. Furthermore, the impact is significant in terms of the potential for socio-economic development and environmental awareness in the affected communities. The impartation of knowledge and skills creates a foundation for sustainable practices in the region. While the immediate effects are local, the long-term benefits could have a regional significance, as the community becomes more adept at managing wastewater and promoting environmental stewardship. The cumulative effect of these individual impacts over time could contribute to a broader positive transformation in the area.

6.4.3 Business opportunities in supply of materials and utilities

During the construction phase of the proposed WSP and composting facility at MU-Tanga Campus in the Pangarawe area, there will be a substantial impact on business opportunities related to the supply of materials and utilities. Local suppliers and businesses involved in providing construction materials, equipment, and utilities such as water and electricity stand to benefit significantly from increased demand. This presents a direct and localized positive impact on the business community in the surrounding areas. However, the students of Rubawa Primary School and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages might experience indirect effects. These effects could range from disruptions in daily routines due to construction activities, changes in the availability of resources, and potential alterations to the local landscape.

The impact is considered moderate and short-term during the construction phase, as it directly affects local businesses and communities but is expected to diminish once construction is completed. The consequences are reversible to some extent, as the disruption caused during construction can be mitigated over time. While the impact is significant for the local economy and communities, its broader regional and national significance is relatively limited. The cumulative effect over time, however, may contribute positively to the socio-economic development of the region, especially if managed responsibly.

6.4.4 Improved infrastructure Development

The construction process will lead to the creation of improved infrastructure, including the establishment of the wastewater stabilization pond and composting facility. This development will positively affect the local community, particularly students from Rubawa Primary School, as well as residents from Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages. The students of Rubawa Primary School will benefit from enhanced sanitation facilities, and the surrounding villages will experience improved waste management and environmental conditions.

The impact is direct as it directly affects the targeted communities in terms of infrastructure development. The effect is localized, primarily benefiting the immediate vicinity of the Mzumbe-Tanga Campus and the mentioned villages. While the construction phase may cause short-term

disruptions, the long-term benefits include a more sustainable and environmentally friendly wastewater management system.

B. NEGATIVE SOCIAL IMPACTS

6.4.5 Influx of people/labour

The influx of people or labor influx is expected to have multifaceted impacts on the local communities. The impacts may include risks of spread of STDs and other communicable diseases, GBV, SH and SEA, Students from Rubawa Primary School may face disruptions to their learning environment due to increased traffic, potentially impacting their academic performance and overall well-being. Residents of the nearby villages might experience changes in their social dynamics, increased demand for local resources, and potential disruptions to their daily lives. The impact can be considered localized, as it primarily affects the immediate vicinity of the construction site. In terms of duration, the effects are likely to be short-term, confined to the construction period. While some impacts may be reversible after the completion of the project, others, such as potential changes in social dynamics, may have longer-lasting consequences.

6.4.6 Community Health, Safety and Security impact

The construction activities may pose immediate risks to the health and safety of the local residents, particularly students from Rubawa Primary School and inhabitants of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages. The noise, dust, and increased traffic associated with construction may contribute to respiratory issues and general discomfort. The disturbance to the local environment could also impact the livelihoods of the residents who rely on the land for sustenance. The extent of impact varies, with direct effects on those in close proximity to the construction site and indirect effects on neighboring communities.

The impact is localized during the Construction phase, affecting the immediate vicinity of the project area. It is moderate in magnitude, as it directly influences the communities within the proximity of the construction activities. The impact is short-term, occurring only for the duration of the construction process, and is reversible once construction is completed. While the effects are significant for those directly affected, in the broader context, they are relatively insignificant at the regional, national, or global level. However, it's essential to consider the cumulative effects of construction activities on the overall environmental and social landscape, as they may contribute to long-term changes in the area's dynamics. The sources of harmful effects to the general public are identified in Table 6.6. 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

6.4.7 Health and Safety Risks

The excavation, heavy machinery operation, and construction activities pose potential hazards such as accidents, falls, and exposure to harmful substances, impacting the well-being of the workers involved. In terms of the local communities, including students from Rubawa Primary School and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages, there could be indirect effects due to noise, dust, and disruptions to daily life. The impact is localized during the construction phase, primarily affecting those in close proximity to the project site. These effects are short-term and reversible once construction is completed. However, if proper safety measures are not enforced, the risks can escalate to have long-term implications. The impact is considered moderate during construction, given the potential risks involved, but it can be managed with appropriate mitigation strategies.

6.4.8 Traffic Congestion

The influx of construction vehicles, machinery, and personnel is expected to exacerbate existing traffic conditions, resulting in delays and disruptions along the transportation routes in the project vicinity. This impact is direct, localized, and short-term, as it directly affects the immediate area surrounding the construction site and is expected to be alleviated once the construction is completed. The communities of Rubawa Primary School, Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages will bear the brunt of this congestion, experiencing inconveniences and potential disruptions in their daily activities. While the impact is significant locally during the construction phase, it is reversible and expected to diminish once the construction activities conclude. To mitigate these effects, proper traffic management strategies and community engagement initiatives should be implemented.

6.4.9 Conflicts and grievances

Construction activities often lead to disruptions in local communities, including noise, dust, and traffic congestion, potentially causing conflicts with residents and businesses in Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages. Students of Rubawa Primary School may experience disturbances affecting their learning environment. Additionally, the influx of construction workers may strain local resources and infrastructure, creating tensions among the communities involved. The impact is direct, localized, and short-term during the construction phase, with potential for moderate significance. The conflicts and grievances are reversible once construction is complete, but if not adequately addressed, they may accumulate and lead to long-term negative social consequences. Overall, the impact on the mentioned communities is potentially significant during the construction phase, but it is expected to diminish in the medium to long term once the project is completed and operational.

6.4.10 Gender discrimination

Construction projects often have a disproportionate impact on certain gender groups, with women frequently facing discrimination or exclusion from employment opportunities and decision-making processes. This could result in unequal distribution of benefits and opportunities during the construction phase.

The students of Rubawa Primary School and residents from Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages are likely to be affected by this project. The construction activities may lead to disruptions in daily life, affecting the accessibility of schools

and basic services. Additionally, the potential gender discrimination may exacerbate existing inequalities within these communities.

The impact of gender discrimination during the Construction phase can be considered indirect, localized, and short-term. It is localized as it primarily affects specific villages in the immediate vicinity of the construction site, and it is short-term since it is linked to the duration of the construction activities. However, the repercussions may be moderate in significance as they can contribute to reinforcing existing gender disparities. The impact is reversible with proper mitigation measures and inclusive policies during and after the construction phase.

6.4.11 Child labor

Child labor may arise due to increased demand for labor during construction activities, where children from vulnerable communities might be exploited or engaged in hazardous work. The students of Rubawa Primary School and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages could be adversely affected. The impact is direct as it involves the exploitation of children for labor purposes. It is localized to the specific villages mentioned and could be considered significant, especially concerning the well-being and rights of the affected children.

In terms of temporality, the impact is short-term during the construction phase, but its repercussions could extend into the medium-term if not adequately addressed. The potential harm is reversible if immediate measures are taken to prevent child labor and enforce labor laws. However, if neglected, it may become irreversible as the affected children may suffer long-term physical and psychological consequences. The impact is not only social but also environmental, as it jeopardizes the community's sustainable development.

6.4.12 Cultural and Social Disruption

The affected communities, including students from Rubawa Primary School and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages, will experience disruptions to their daily routines, traditional activities, and social interactions. The noise, dust, and increased traffic associated with construction activities may lead to disturbances in the community fabric. Furthermore, potential changes in the landscape and water usage patterns could impact cultural practices and community dynamics. This disruption is direct, localized, and, to some extent, reversible in the short term, but its long-term effects on community cohesion and cultural practices may linger. The cumulative impact of these disruptions, when considered alongside other ongoing or planned projects in the region, may amplify their significance, making the overall impact more pronounced at a regional level. It is crucial for project planners to implement effective mitigation measures and engage in community consultations to minimize these adverse effects and foster positive social outcomes.

C. NEGATIVE ENVIRONMENTAL IMPACTS

6.4.13 Air pollution due to dust emission and gas from vehicle emission

The construction activities are likely to result in the emission of dust and gases from vehicle exhaust, contributing to air pollution in the surrounding areas. The affected communities, including students from Rubawa Primary School and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages, will experience deteriorating air quality, potentially leading to respiratory issues and other health concerns.

The impact is direct as the emission sources are in close proximity to the affected communities. It is localized, primarily affecting those residing near the construction site, and the impact is considered moderate. While the pollution is expected to be prevalent during the construction phase, it is likely to be short-term as construction activities cease upon completion. The impact is reversible to some extent, as air quality can improve once construction concludes. However, if not properly managed, the cumulative effect of prolonged construction activities may exacerbate the environmental and health consequences, making it significant in the short term and potentially leading to long-term issues if not mitigated effectively.

6.4.14 Soil Erosion

The excavation, movement of heavy machinery, and other construction activities can disturb the natural vegetation cover and topsoil, leading to increased vulnerability to erosion. This environmental impact will directly affect the nearby communities, including Rubawa Primary School, and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages. The direct consequences for the students and people residing in these areas include potential sedimentation in nearby water bodies, degradation of agricultural lands, and an overall disruption of the local ecosystem.

The impact of soil erosion during the Construction phase is both direct and localized, primarily affecting the immediate vicinity of the project site. It is likely to be of moderate intensity, posing a tangible threat to the stability of the local environment. While the short-term effects might be reversible with proper mitigation measures, the medium to long-term consequences could be more persistent. The impact is significant at a local level but may not extend to a regional or national scale. However, it should be noted that the soil erosion could contribute to cumulative environmental degradation over time. Adequate erosion control measures and sustainable construction practices must be implemented to minimize the adverse effects on the surrounding communities and ecosystems.

6.4.15 Land Clearance

The clearance of land involves the removal of vegetation cover and disruption of natural habitats. Loss of vegetation can also lead to soil erosion, loss of biodiversity and air pollution during construction phase. Measures should be implemented to mitigate these impacts, involving the affected communities in decision-making processes and ensuring sustainable land use practices**.**

6.4.16 Water pollution due to oil/fuel leakage from vehicles and construction equipment

This contamination can have detrimental effects on the surrounding environment, particularly impacting water bodies such as rivers and groundwater. The leakage of oil and fuel contains harmful chemicals that can lead to the degradation of water quality, posing a threat to aquatic ecosystems and potentially affecting the health of the communities relying on these water sources. The impact is localized, as it directly affects the specific villages mentioned above. It is also considered significant, as water pollution can lead to health issues and disruptions in daily activities for the affected communities. The nature of the impact is short-term during the construction phase, but the long-term consequences may persist if proper mitigation measures are not implemented. Furthermore, the impact is reversible to some extent through the implementation of effective pollution control measures and environmental management practices. However, if not

addressed appropriately, the consequences may become irreversible, leading to long-lasting damage to the local ecosystems and communities. The impact is cumulative, meaning that the effects may accumulate over time, exacerbating the environmental and social challenges faced by the communities in the region.

6.4.17 Impact on climate change

The construction activities, such as excavation, transportation of construction materials, and machinery operation, are likely to contribute to increased carbon emissions and energy consumption. This will directly affect the local climate by adding to greenhouse gas concentrations, these Green House Gases (GHGs) are known to interfere with temperature system and cause climate change effects. Students from Rubawa Primary School, as well as residents from Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages, may experience disruptions in their daily lives due to noise, dust, and changes in air quality.

The impact is both direct and localized, affecting the immediate vicinity of the construction site. While the effects are expected to be short-term during the construction phase, the long-term consequences of climate change may have broader implications for the region and nation. The impact is considered reversible once construction is complete, but the long-term effects on climate change are irreversible. Overall, the cumulative impact is significant, as it contributes to a larger pattern of environmental change. The social and environmental implications should be carefully considered in the planning and execution of the project to minimize adverse effects on the affected communities.

6.4.18 Increased Noise and vibration level

The construction activities, such as heavy machinery operation and excavation, will contribute to elevated noise and vibration levels in the surrounding areas. This impact is likely to affect the daily lives of students at Rubawa Primary School and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages. The noise may disrupt classroom activities and daily routines, while increased vibrations may lead to structural concerns for nearby buildings.

This impact is considered direct, localized, and short-term, as it specifically affects the immediate vicinity of the construction site and is expected to be temporary in nature.
However, the impact is reversible once the construction is completed, it remains significant in the short term due to its potential to disrupt the normal activities of the affected communities. Cumulatively, however, these short-term disruptions may have lasting effects on the social well-being of the communities involved**.**

6.4.19 Generations of Solid and Liquid Wastes

The project is likely to produce generations of such wastes, contributing to increased pollution and ecological disruption. The students of Rubawa Primary School and the residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages will be directly affected by the construction activities and the subsequent waste management processes. The impacts are expected to be localized, with immediate consequences for the communities in close proximity to the project site. The environmental and social effects are likely to be moderate and reversible in the short term, but if not adequately managed, they may escalate to long-term and irreversible consequences, becoming significant at both regional and national levels. The cumulative impact

of the project, when combined with other ongoing or planned activities in the area, could exacerbate the overall environmental and social challenges. The students and communities will face potential health risks, disruptions in daily life, and the degradation of natural resources, necessitating careful mitigation measures and community engagement throughout the project's lifecycle.

The construction project might come across subpar excavated soil or rock that requires proper disposal. The construction activities will produce both organic and inorganic solid and liquid waste, necessitating adherence to government regulations for disposal at specified locations. Failure to comply could result in environmental littering and pollution.

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. This impact is moderate, localized and will be long term.

6.4.21 Loss of vegetations

Much of the natural vegetation in the project area is characterized by bushes and shrubs. Overall, the clearance of the plants will have significant impacts on ecology of the site and the nearby surroundings by destructing the ecological functioning of the area.

The only negative impact anticipated from clearing of vegetation will be opening up of the area especially by felling indigenous trees 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 moderate, local and will be of long term.

6.5 Possible Potential Impacts during Demobilization 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 IMPACTS

6.5.1 Reduced Traffic and Congestion

The completion of the project is likely to lead to a decline in construction-related traffic and congestion in the affected regions. This will bring about a temporary relief to the communities, including Rubawa Primary School students and residents from Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages.

The reduced traffic and congestion will have direct and localized positive effects on the affected communities. Students commuting to Rubawa Primary School will experience safer and more efficient travel, while residents in Pangarawe and neighboring villages will enjoy improved accessibility and reduced disruptions in their daily activities.

The impact is short-term and reversible, as it is linked to the construction and demobilization phases of the project. In terms of significance, it is considered moderate, offering tangible benefits to the local communities without causing substantial, long-lasting changes.

6.5.2 Lessened Risk of Accidents

The decommissioning and demobilization process will involve the removal and proper disposal of potentially hazardous materials and equipment, reducing the risk of accidents related to the operation of the wastewater stabilization pond and composting facility. This mitigation measure ensures the safety of both the environment and the surrounding communities.

Students from Rubawa Primary School, as well as residents from Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages, will experience direct positive effects. The lessened risk of accidents contributes to a safer living environment, safeguarding the well-being of the local population, including school children, who may otherwise be exposed to potential hazards.

The impact can be categorized as direct since it directly affects the safety of the communities in the proximity of the project site. It is also localized as the primary beneficiaries are the residents of the specific villages mentioned. The duration of the impact is likely to be long-term, given that the risk reduction measures implemented during the demobilization phase will have lasting effects. The impact is reversible, as it involves the removal of hazardous materials, and it is considered significant in terms of improving safety conditions for the affected communities.

6.5.3 Reduced noise levels

This positive outcome can be attributed to the winding down of construction activities and the overall operational efficiency of the wastewater treatment and composting processes. The reduction in noise levels is expected to have direct and localized benefits, particularly for the nearby communities of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages, as well as students from Rubawa Primary School. The direct impact means that these communities will experience a noticeable decrease in noise pollution within their immediate vicinity. This positive change is anticipated to be significant, providing residents and students with a quieter and more peaceful environment. The impact is reversible and is expected to be sustained in the long term as the facility continues its operations with minimized construction-related activities.

6.5.4 Minimized Soil Erosion

The project aims to minimize soil erosion as a key environmental impact mitigation measure. By implementing erosion control measures such as vegetation cover and bioengineering techniques, the project seeks to safeguard the integrity of the soil in the surrounding areas. This initiative will have a direct and localized impact on the communities neighboring the facility, including Rubawa Primary School, and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages.

The direct impact on these communities is significant, as minimized soil erosion contributes to improved soil fertility, reduced sedimentation in water bodies, and enhanced agricultural productivity. Students at Rubawa Primary School will benefit from a more stable and fertile

environment for outdoor activities and learning. The people in Pangarawe and neighboring villages will experience improved agricultural yields, ensuring food security and economic stability. The impact is expected to be long-term and reversible, given the sustained implementation of erosion control measures.

6.5.5 Improved Local Aesthetics

This impact is characterized by the enhancement of the visual and environmental appeal of the surrounding areas due to the implementation of the wastewater treatment and composting project. The establishment of the facility is expected to contribute positively to the overall aesthetics of the Pangarawe area, positively influencing the landscape and creating a more visually appealing environment.

The students of Rubawa Primary School, as well as the residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages, will experience the effects of this impact. The improved local aesthetics will likely foster a sense of pride and well-being among the community members, creating a more pleasant living and learning environment for the students of Rubawa Primary School. Additionally, residents in the aforementioned villages will benefit from a visually enhanced landscape, contributing to an overall improved quality of life.

The impact can be considered as a direct and localized effect, primarily affecting the immediate vicinity of the wastewater stabilization pond and composting facility. It is expected to be significant and positive, contributing to the well-being of the local population. This impact is likely to be both short-term and long-term, as the aesthetic improvements will be noticeable immediately upon project completion and are expected to persist over an extended period.

Furthermore, the impact is reversible, as discontinuation of the project or implementation of mitigation measures can potentially restore the aesthetics to their previous state. Considering the positive nature of the impact and its localized scope, it can be classified as insignificant at the regional and national levels. However, it should be noted that the cumulative effects of positive changes in local aesthetics, when combined with other project impacts, contribute to an overall enhancement of the social and environmental aspects in the region.

B. NEGATVE SOCIAL IMPACTS

6.5.6 Loss of employment

This impact is likely to affect not only skilled labor directly involved in construction and operation but also support staff and workers from various sectors. Among those significantly affected are students from Rubawa Primary School and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages. The loss of employment may lead to economic challenges, especially in these local communities. This impact is both direct and localized, with immediate consequences for individuals in close proximity to the project site. While the loss of employment is reversible in the long term as alternative opportunities may arise, its short-to-medium-term effects are likely to be significant, particularly for those without immediate alternative sources of income. The cumulative effect of this loss of employment on the affected communities could be substantial, considering the interconnected nature of social and economic dynamics in the region.

6.5.7 Impact due to Health and Safety Risks

The potential release of hazardous substances and pathogens during the demobilization process poses a direct and localized threat to the health of students from Rubawa Primary School and

residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages. These risks may include exposure to contaminants, air pollutants, and waterborne pathogens, leading to adverse health effects such as respiratory issues, waterborne diseases, and other related ailments. The impact is expected to be short-term during the demobilization phase, but if not managed effectively, it could have medium to long-term consequences. The nature of the impact is reversible with proper mitigation measures, although the significance of the impact depends on the effectiveness of health and safety protocols implemented during demobilization.

C. NEGATIVE ENVIRONMENTAL IMPACTS

6.5.8 Potential for Soil Contamination

This arises from the discharge of treated or untreated wastewater into the soil, which can introduce pollutants and chemicals that may affect the quality and fertility of the soil. The students of Rubawa Primary School and the residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages would be directly impacted by this project. The contamination may affect the agricultural activities in these areas, potentially leading to reduced crop yields and compromised food safety. This impact is both localized and direct, as it directly influences the soil quality in the immediate vicinity of the project. Furthermore, the contamination is likely to have a long-term and potentially irreversible effect on the soil, as pollutants may persist over an extended period, impacting the ecosystem. The cumulative effect of soil contamination could be significant, particularly if not addressed promptly, leading to broader environmental and social consequences for the region.

6.5.9 Disruption to Local Ecosystems

The construction and operation of such facilities can lead to habitat alteration, water quality changes, and disturbances to vegetations in the surrounding areas. This disruption is likely to have direct and localized impacts on the environment, affecting ecosystems in Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages.

Students from Rubawa Primary School and residents from the aforementioned villages may experience adverse effects on their daily lives. The construction process may generate noise, dust, and air pollution, affecting the well-being of individuals in the short term. Additionally, the alteration of local ecosystems could have long-term consequences for water resources, and overall environmental health, potentially leading to changes in livelihoods and socio-economic dynamics. The impact is deemed significant due to its direct, localized, and potentially long-term nature, necessitating careful mitigation measures to minimize adverse effects and promote sustainable development.

6.5.10 Waste Generation

The construction and operation of the facility may lead to the generation of solid and liquid waste, contributing to pollution and ecological disturbance in the surrounding areas. The affected communities, including students from Rubawa Primary School and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages, are likely to experience the consequences of increased waste production, potentially affecting local ecosystems, water quality, and overall environmental health. The impact is direct and localized, with immediate effects felt by the nearby communities. The waste generated may have short-term and medium-term effects on the environment, with the potential for long-term consequences if proper waste management measures are not implemented. Depending on the effectiveness of mitigation strategies, the impact

may be reversible, but if left unaddressed, it could become irreversible over time. The overall significance of the impact is subject to the effectiveness of waste management practices and community engagement efforts.

6.6 Possible Potential Impacts during Operations and Maintenance Phase

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

A. POSITIVE SOCIAL IMPACT

6.6.1 Improved Health and Safety of people

The implementation of the wastewater stabilization pond and composting facility is expected to mitigate environmental hazards associated with improper waste disposal, leading to a reduction in waterborne diseases and contamination. The residents, including students from Rubawa Primary School and people from Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages, will experience enhanced well-being due to decreased exposure to harmful pathogens and pollutants in their surroundings.

This impact can be classified as direct, localized, and significant, as it directly affects the communities in the project vicinity. The improvement in health and safety is both short-term and long-term, with immediate benefits upon implementation and sustained positive effects over an extended period. The impact is reversible, as long as the wastewater stabilization pond and composting facility are properly maintained. It contributes to a regional and potentially national benefit by addressing public health concerns related to water contamination.

6.6.3 Employment Opportunities

The project is expected to generate direct employment opportunities, particularly in the form of skilled and unskilled labor required for the day-to-day functioning of the facility. Additionally, there will likely be indirect employment opportunities arising from the need for supporting services such as transportation, catering, and maintenance. The impact on students from Rubawa Primary School and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages is significant. Residents may find employment in various capacities, and students might benefit from educational initiatives or training programs associated with the project. The impact is localized, affecting the immediate vicinity, and is expected to be both short-term and long-term, as employment opportunities may persist over an extended period. While the impact is reversible in the sense that the project can be dismantled, the long-term benefits to employment are likely to leave a lasting positive effect on the local community.

6.6.4 Educational Opportunities

The project will create a platform for hands-on learning and research opportunities in environmental science, water management, and sustainable agriculture for students. Rubawa Primary School and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages will benefit from educational outreach programs, workshops, and training sessions conducted by the project team.

The impact on students and the community can be categorized as direct, localized, and long-term. The direct impact stems from the educational programs and research opportunities provided by the project, enhancing the learning experience for students. The impact is localized as it primarily affects the immediate vicinity of the MU-Tanga Campus and the surrounding villages. The long-

term nature of the impact is evident in the sustained educational opportunities and improved environmental awareness among the community members. The impact is reversible to some extent, as discontinuation of the project could lead to a decline in educational initiatives, but the knowledge gained during the project is likely to have a lasting effect.

B. POSITIVE ENVIRONMENTAL IMPACTS

6.6.5 Improved Water Quality

The introduction of these facilities will contribute to the reduction of pollutants in the water, ensuring a cleaner and safer water supply for the surrounding communities. Students from Rubawa Primary School and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages will directly benefit from improved water quality, leading to enhanced public health and well-being. The impact is localized to the immediate vicinity of the project site but has regional implications for water resources. It is considered a long-term and potentially irreversible positive change, as the establishment of the facilities is expected to have lasting effects on water quality. The impact is significant in terms of environmental and social benefits, positively affecting the health and livelihoods of the local communities. Additionally, the project's positive effects on water quality are cumulative, as they will continue to compound over time, ensuring sustained benefits for the region.

6.6.6 Improved Sanitation

Improved sanitation, a key outcome of this project, will positively affect the daily lives of the residents in Rubawa Primary School, as well as the communities in Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages. The direct impact will be felt by students, who will benefit from a cleaner and healthier learning environment. Indirectly, the wider community will experience enhanced public health due to better waste management practices. The impact is localized to the immediate vicinity of the project area, and its significance is moderate. The positive effects are expected to be both short-term and long-term, as the sanitation improvements contribute to sustained community well-being. The impact is reversible, given the nature of the implemented facilities, and cumulative over time, as the benefits compound to create a lasting positive change in the region. Overall, this project is anticipated to bring about a significant improvement in sanitation conditions for the local population, fostering a healthier and more sustainable living environment.

6.6.7 Increase soil fertility due to the generation of natural fertilizer

The organic matter produced from the composting facility will serve as a nutrient-rich amendment, enhancing the soil quality in the surrounding areas. Students from Rubawa Primary School and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages will benefit from this impact. The direct beneficiaries will include local farmers who can use the natural fertilizer to improve crop yields, leading to increased agricultural productivity. The impact is localized and moderate, as it directly affects the immediate vicinity of the project site and has a noticeable but not overwhelming effect on soil fertility.

The social impact on the communities is significant, as improved soil fertility can contribute to food security and economic well-being. Farmers in the mentioned villages will experience a positive change in their agricultural practices, potentially leading to increased income and improved livelihoods. This impact is considered long-term and reversible, as it depends on the continued operation of the wastewater stabilization pond and composting facility. If properly

maintained, the benefits to soil fertility can be sustained over an extended period. The cumulative effect of this impact, when combined with other positive outcomes of the project, could contribute to broader regional and even national environmental and social benefits, albeit indirectly. Overall, the impact is deemed significant in enhancing local agricultural sustainability and community well-being.

6.6.8 Reduced Odor and Aesthetics

During the Operation and Maintenance phase of the proposed wastewater stabilization pond and composting facility at Mzumbe-Tanga Campus in the Pangarawe area, Gombero Village, Gombero Ward, Mkinga District in Tanga Region, there will be a significant impact on reducing odor and improving aesthetics in the surrounding environment. This reduction in unpleasant odors and enhancement of aesthetics will directly benefit the communities residing in Rubawa Primary School, Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages.

The impact is direct as it directly affects the sensory experience and visual perception of the individuals in these communities. It is localized, affecting the immediate vicinity of the project site and the mentioned villages. The positive effects are likely to be long-term and reversible, as proper operation and maintenance practices can sustain the improved environmental conditions. This impact is deemed significant as it contributes to the overall well-being and quality of life for the residents in the project's vicinity, fostering a healthier and more pleasant living environment.

6.6.9 Water Conservation

The establishment of the WSP and composting facility at Mzumbe-Tanga Campus in the Pangarawe area, during the Operation and Maintenance phase, particularly focusing on water conservation, will have profound impacts on the environment and the social fabric of the surrounding communities. The direct impact on water conservation will lead to a more sustainable and responsible use of water resources. However, the students of Rubawa Primary School and the residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages may experience indirect and localized effects. The indirect impact stems from changes in the local water table and quality, affecting agriculture and daily water needs.

The localized impact is due to alterations in the immediate surroundings of the project area, influencing the water sources utilized by the aforementioned communities. The effects are expected to be moderate in both magnitude and duration. While the project's focus on water conservation is positive, there may be short-term disruptions and adjustments required by the local population. The impact is reversible if appropriate mitigation measures are in place, and its significance is likely to decrease over time as communities adapt. Cumulatively, the project contributes to the broader regional and national goal of environmental sustainability, making its overall impact significant in the long-term**.**

B. NEGATIVE ENVIRONMENTAL IMPACTS

6.6.10 Foul smell (Odor)

During the Operation and Maintenance phase of the proposed WSP and composting facility at MU-Tanga Campus several environmental and social impacts are anticipated, with a notable concern being the foul smell or odor emanating from the wastewater treatment and composting process. This olfactory nuisance could potentially affect the neighboring communities, including Rubawa Primary School, and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages. The impact is direct and localized, as it directly affects the

immediate surrounding areas. The foul smell is likely to be moderate, particularly during the operation and maintenance activities, causing discomfort to the local residents. However, it is expected to be short-term and reversible, as the odor should dissipate once the wastewater treatment processes are completed. While the impact is significant in terms of immediate discomfort, it is considered insignificant in the long term, given the reversible nature of the odor and the localized nature of the impact. Cumulatively, this impact is part of the broader environmental and social considerations associated with the wastewater treatment facility.

6.6.11 Mosquitoes breeding

Mosques breeding" refers to the potential unintended consequence of the project becoming a breeding ground for mosquitoes. This could occur due to the stagnant water in the stabilization ponds providing a suitable environment for mosquito larvae to thrive. Students from Rubawa Primary School, as well as residents from Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages, may be adversely affected as increased mosquito populations could lead to a rise in mosquito-borne diseases.

The impact is indirect, localized, and short-term, as it arises from a secondary consequence of the project. However, if not properly managed, it could become a moderate and reversible issue. Mitigation measures such as regular maintenance, mosquito control strategies, and community awareness programs can be implemented to address this concern. Overall, while the impact is not insignificant, it is manageable with appropriate measures, making it crucial to incorporate these considerations into the project's planning and execution to ensure a sustainable and socially responsible outcome.

6.6.12 Increased Water Pollution

This impact stems from the discharge of effluents from the wastewater treatment process into nearby water bodies, leading to a rise in pollutant levels. The students of Rubawa Primary School and the residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages will be adversely affected by this project. The direct consequences include compromised water quality, negatively impacting aquatic ecosystems. The indirect effects involve potential health hazards for the communities relying on local water sources for drinking and daily activities. This impact is localized to the immediate vicinity of the wastewater discharge, with a moderate severity that could escalate to a regional level if not addressed adequately. The consequences are both short-term and long-term, with potential irreversibility if prompt corrective measures are not implemented. The cumulative effect over time can be significant, exacerbating the overall environmental and social impact. It is crucial to implement mitigation measures and closely monitor the wastewater management to minimize adverse consequences.

6.6.13 Overflowing of sludge into the surrounding environment

there is a significant risk of sludge overflow into the surrounding farms or roads. This occurrence can have severe environmental and social consequences. The overflow of sludge, rich in pollutants and contaminants, could contaminate agricultural lands, posing a direct threat to the livelihoods of farmers in Rubawa Primary School and the neighboring villages of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima. The direct impact on these communities includes potential damage to crops, soil degradation, and the contamination of water sources. This would lead to a decline in agricultural productivity, affecting food security and the overall well-being of

the local population. The impact is localized to the immediate vicinity of the wastewater facility but has widespread consequences for the affected communities.

In terms of the nature and duration of the impact, it is both direct and long-term. The direct nature stems from the immediate consequences of sludge overflow on agriculture and water sources. The long-term aspect is associated with the gradual degradation of soil quality and the persistence of pollutants in the environment. The impact is reversible to some extent with appropriate remediation measures, but the recovery process would be prolonged. Considering the significance of the impact, it falls into the category of being substantial, especially concerning the potential harm to agriculture and water resources. It is crucial for the project developers to implement effective mitigation measures and monitoring protocols during the Operation and Maintenance phase to minimize the risk of sludge overflow and safeguard the well-being of the affected communities.

6.7 Possible Potential Impacts during Decommissioning Phase

Decommissioning will occur after the construction and operation of this WSP. During this period, it is possible that ponds and infrastructure facilities will be retrofitted at the sites, so major changes and expansions may be necessary. At the end of the WSP life, a scheduled plant will be necessary to remove the site component, a process referred to as decommissioning.

A. POSITIVE SOCIAL IMPACTS

6.7.1 Job Creation

The implementation of such a project is likely to generate temporary employment opportunities during this phase, ranging from skilled labor and unskilled laboul to support staff for day-to-day operations. This will directly impact the local communities from pangarawe area, including residents of Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages. The impact is primarily direct and localized, with immediate benefits for the surrounding communities.

The direct beneficiaries of job creation include the residents of Gombero Village and other nearby areas, positively influencing the socio-economic landscape. This impact is likely to be both short-term and long-term, with immediate job opportunities during construction and continuous employment during the operational phase. The nature of job creation suggests that the impact is reversible, as it depends on the ongoing need for facility maintenance and operation. While the impact is significant for the individual's securing employment, it may be considered insignificant in the broader regional or national context. However, the cumulative effect of sustained job creation can contribute to long-term community development and well-being.

B. NEGATIVE SOCIAL IMPACTS

6.7.2 Loss of employment and business opportunities

During the decommissioning phase of the proposed establishment of a Wastewater Stabilization Pond and Composting Facility at MU-Tanga campus, Tanga Region, the community may experience a substantial loss of employment and business opportunities. As the project concludes, the need for construction and maintenance workers diminishes, leading to job layoffs and reduced demand for local goods and services. This economic downturn will have a cascading effect on the communities surrounding the project site, including Rubawa Primary School and villages such as Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima. Students and residents

who may have relied on employment opportunities generated by the project, such as construction jobs or service provision, will face challenges in sustaining their livelihoods.

This impact is direct, localized, and long-term, as the economic consequences are likely to persist well beyond the Decommissioning phase. The loss of employment and business opportunities is reversible to some extent, but the recovery may take time. In the context of the affected communities, this impact is significant and cumulative, with the potential to exacerbate existing socioeconomic vulnerabilities.

6.7.3 Health and Safety Concerns

Decommissioning involves the cessation of operations and the dismantling of infrastructure, potentially leading to the release of hazardous materials, soil disturbance, and potential exposure to harmful substances. This poses a direct and localized risk to the surrounding communities, particularly the students of Rubawa Primary School, and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages. The health and safety impacts on these communities are likely to be both short-term and medium-term, with the potential for long-term consequences if not adequately managed. The impact is reversible if proper mitigation measures are implemented during the decommissioning process, but without proper safeguards, the consequences may become irreversible over time. Given the direct and localized nature of the impact, it can be considered significant for the affected communities, emphasizing the need for careful planning, monitoring, and mitigation strategies during the decommissioning phase to protect the health and well-being of the people in the area.

6.7.4 Loss of Community Assets

The decommissioning process may lead to the displacement or destruction of vital community resources, such as communal spaces, agricultural land, and water sources, which are crucial for the livelihoods of the residents. This loss of community assets could have a direct and localized impact on the residents of Rubawa Primary School, as well as people from Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages.

Students at Rubawa Primary School may experience disruptions to their education and daily routines, while the broader community, including the mentioned villages, may suffer the loss of essential resources for agriculture and daily living. The impact is both direct, as it directly affects the affected communities, and localized, as the consequences are concentrated in the immediate vicinity of the project site.

The nature of the impact is likely to be more pronounced in the short to medium term, given the immediate consequences of decommissioning. However, depending on the effectiveness of mitigation measures and the adaptation strategies employed by the affected communities, some aspects of the impact may be reversible. Nevertheless, the overall effect could be significant, especially if the loss of community assets is not adequately addressed and mitigated. The impact is cumulative, as it builds upon the changes introduced during the project's various phases, making it imperative to carefully assess and manage the potential long-term consequences.

6.7.5 Disruption of social economic activities

The communities surrounding the project site, including students from Rubawa Primary School and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages,

will be directly affected by this disruption. The construction and operation of the wastewater facility may lead to the temporary displacement of residents, interruption of local businesses, and disturbance of daily routines, impacting the social fabric of these communities. The disruption can be considered localized, as it primarily affects the immediate vicinity of the project site. While the impact is expected to be short-term during the construction and commissioning phases, the socio-economic effects may persist into the medium term as the community adapts to the changes. The reversibility of the impact is contingent on effective mitigation measures and community engagement strategies during and after project implementation.

C. POSITIVE ENVIRONMENTAL IMPACTS

6.7.6 Improved Aesthetics

The decommissioning process aims to enhance the visual appeal by removing obsolete structures and rehabilitating the landscape, resulting in a more visually pleasing and harmonious setting. This improvement in aesthetics may positively influence the well-being of the local community and ecosystem, providing a cleaner and more attractive environment.

However, the students from Rubawa Primary School, as well as the residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages, might experience both direct and indirect effects. Direct impacts could include changes in the immediate surroundings of the decommissioned facility, affecting local access and visual exposure. Indirect impacts might involve altered traffic patterns during the decommissioning process, potentially influencing daily routines and activities. The impact is predominantly localized to the immediate vicinity of the Mzumbe-Tanga Campus and its neighboring villages. The aesthetic improvements are likely to be experienced in the short-term as the decommissioning progresses, but the lasting visual benefits will extend into the medium and long-term. The effects are reversible to some extent, as the improved aesthetics can be maintained through ongoing environmental management practices.

In terms of significance, the impact on aesthetics is likely to be considered moderate, as it primarily addresses visual aspects without substantial alterations to the socio-economic fabric of the affected communities. Additionally, the impact is cumulative, as the improved aesthetics contribute to the broader environmental and social improvements associated with the wastewater stabilization pond and composting facility project. Overall, the impact is considered insignificant in terms of negative consequences and can be mitigated through proper planning and community engagement during the decommissioning phase.

6.7.7 Habitat Restoration

The project's decommissioning activities may involve the restoration of affected habitats to their pre-construction state, aiming to mitigate environmental disturbances caused during the construction and operational phases. Habitat Restoration efforts will focus on the rejuvenation of ecosystems disrupted by the project and ensuring the sustainable functioning of local ecosystems. The students of Rubawa Primary School, along with the residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages, will experience both direct and indirect impacts during this phase. Direct impacts involve changes occurring immediately due to the decommissioning activities, such as alterations in the physical landscape. Indirect impacts, on the other hand, may manifest over time, possibly affecting the availability of resources or altering local ecosystems. The impact is localized, primarily affecting the immediate vicinity of the project site

and the surrounding villages. The effects are likely to be moderate, with the potential for disruption of local ecosystems and daily activities.

In terms of duration, the impact is generally short-term, as habitat restoration activities aim to quickly mitigate disturbances caused during decommissioning. The nature of the impact is reversible, as the goal is to restore habitats to their pre-construction conditions. However, the overall significance of the impact depends on the effectiveness of the restoration efforts and the degree of disruption caused during the project's lifecycle. It is crucial for the stakeholders to carefully monitor and manage these impacts to ensure the long-term sustainability of the local environment and the well-being of the affected communities. Additionally, the cumulative impact of the decommissioning activities should be considered, taking into account any previous disturbances caused by the construction and operational phases of the wastewater stabilization pond and composting facility.

C. NEGATIVE ENVIRONMENTAL IMPACTS

6.7.8 Release of Contaminants

During the decommissioning phase of the proposed establishment of a WSP and composting facility at MU-Tanga Campus in the Pangarawe area, the potential release of contaminants poses a significant environmental concern. Contaminants from the decommissioning activities, such as residual chemicals, heavy metals, and other pollutants, may be released into the surrounding soil and water, impacting the ecosystem. This release could lead to soil degradation, water pollution, and potential harm to aquatic life.

The students from Rubawa Primary School, as well as the residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages, are likely to be affected by this environmental impact. The contamination may result in reduced water quality for domestic use and agriculture, posing health risks to the communities. Additionally, the release of contaminants could affect vegetations, disrupting the balance of the ecosystem and potentially impacting the livelihoods of those dependent on agriculture and fishing.

The impact is both direct and indirect, as the contaminants directly affect the environment and indirectly impact human health and local economies. It is localized, as the immediate vicinity of the project site and nearby villages will experience the most significant effects. The impact is likely to be moderate, with potential adverse consequences for the affected communities. In terms of duration, the impact is expected to be long-term, as contaminants may persist in the environment for an extended period. The reversibility of the impact depends on the efficiency of mitigation measures and remediation efforts implemented during and after decommissioning. However, some long-term effects may be irreversible, especially if certain contaminants cause permanent damage to the ecosystem. The overall significance of the impact is considerable, considering the potential harm to the environment, human health, and local livelihoods. The impact is cumulative, as it adds to other environmental stressors in the region, amplifying the overall ecological and social consequences.

6.7.9 Water pollution

The discharge of treated or untreated wastewater from the facility may introduce contaminants into local water bodies, negatively affecting the aquatic ecosystem and water quality. This poses a direct and localized threat to communities residing in Pangarawe, Gombero, Vunde Manyinyi,

Jirihini, Kichangani, and Dima villages, particularly the students of Rubawa Primary School. The immediate consequence could be the degradation of water sources, leading to health hazards and reduced access to clean water for the affected communities.

The impact is primarily direct, as it directly affects the water quality in the nearby area. It is also localized since the effects are concentrated in the immediate vicinity of the project site. The potential consequences are both short-term, as immediate pollution may occur, and long-term, as continuous exposure to contaminated water can have lasting effects on the environment and public health. Additionally, the impact is reversible to some extent with proper mitigation measures, but if left unaddressed, it could become irreversible, resulting in sustained environmental damage. The significance of the impact is noteworthy, especially for the communities directly dependent on local water sources, making it crucial to implement effective measures to minimize and manage water pollution during the decommissioning phase.

6.7.10 Soil pollution

The decommissioning activities, which may include the removal of infrastructure, handling of waste materials, and potential release of contaminants, could lead to the contamination of soil in the surrounding areas. The students of Rubawa Primary School and the residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages are likely to be directly affected by this soil pollution, as it can compromise agricultural productivity, harm ecosystems, and impact water quality.

The impact is both localized and potentially regional, as it affects specific villages nearby but may also have broader repercussions on the surrounding environment. In terms of duration, the impact is likely to be long-term, as soil pollution can persist over extended periods, affecting future generations. The consequences of soil pollution are generally irreversible or take a significant amount of time for remediation. This makes the impact on the affected communities and ecosystems significant, with potential far-reaching implications for the region's ecological balance and agricultural sustainability. The cumulative effect of the decommissioning phase, when considered alongside other potential environmental stressors, could amplify the overall impact on the ecosystem and community well-being. Therefore, it is crucial for comprehensive mitigation measures to be implemented to minimize the adverse effects of soil pollution during the decommissioning phase of the wastewater stabilization pond and composting facility project.

6.7.11 Air pollution

The potential impact on air pollution could arise from the release of pollutants during the dismantling and disposal of infrastructure and equipment. Air pollution may result from the combustion of waste materials or the release of airborne contaminants during the decommissioning process. This could have direct and localized effects on the surrounding environment, affecting the air quality in Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages.

Students from Rubawa Primary School and the residents of the aforementioned villages may experience health issues, such as respiratory problems, due to exposure to air pollutants. The impact is direct and localized, as it directly affects the immediate vicinity of the decommissioning site. While the duration of the impact is short-term, as it occurs during the decommissioning phase, the consequences can be moderate to significant, depending on the extent and nature of pollutants released.

The air pollution during decommissioning is potentially reversible if appropriate mitigation measures are implemented promptly. However, if left unaddressed, the consequences could accumulate over time, leading to long-term and irreversible damage to the air quality in the region. Therefore, it is crucial for the project to incorporate effective environmental management strategies and community engagement to minimize the negative impacts on the surrounding areas.

6.7.12 Noise and vibration pollution from demolishing works

This impact will be particularly pronounced due to the nature of the activities involved in dismantling existing structures and clearing the site for the new facility. The students of Rubawa Primary School and residents of Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages will likely experience disruptions to their daily routines, affecting their concentration, sleep patterns, and overall well-being. The noise and vibrations may cause discomfort, especially for the students, potentially leading to temporary declines in academic performance.

This impact is direct, as it directly affects the communities in proximity to the decommissioning activities. It is localized since the immediate area surrounding the demolition site will experience the most pronounced effects. The impact is short-term during the decommissioning phase but can be considered reversible once the construction is completed and the demolition activities cease. However, it contributes to the cumulative environmental and social impacts associated with the entire project. While the noise and vibration pollution is significant at the local level, it may be deemed insignificant at the regional, national, or global scales. However, the community-level impacts should not be understated, as they can have lasting effects on the affected individuals and communities in the medium to long term.

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 Impacts from existing major facilities

6.8.1.1 Noise

The noise impact assessment described was performed using the baseline assumption that noise impacts from construction and operating proposed project were additive to the noise sources already in existence area from all existing nearby operation, commercial activities and other noise sources. The cumulative effects of the existing operation and other noise sources, together with the project, are assessed to not exceed the recommended ambient noise levels.

6.8.1.2 Socio economic Issues

The cumulative impact on the Tanzania and Tanga City economy will be strongly a positive one. Significant additional resources will be realized by the result of this project, which is consistent with the government's long term development plan. The additional licensing income, among other

sources of additional income, will add to the already increasing government revenues and economic growth resulting from expanded and diversified business development in Mkinga District Council.

6.8.1.3 Increase of odour/smell

As the project involves the treatment of wastewater and the composting of organic materials, the release of gases and odorous compounds may become more pronounced. The cumulative effect arises from the combination of various activities within the facility, including the decomposition of organic matter during composting and the natural processes occurring in the wastewater stabilization ponds. The potential increase in odour could have implications for the surrounding communities, affecting their quality of life, health, and general well-being. Adequate mitigation measures and technologies must be considered in the planning and implementation phases to minimize the adverse effects on the air quality and olfactory environment in the Gombero Village and its vicinity. Public engagement and awareness programs may also be essential to address concerns and foster community support for the project.

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.

6.9.1 Factors considered.

- **Existing policies, legislation and standards** regarding construction project based on wastewater stabilization ponds and other infrastructures in Tanzania; A review of available policies, legislation and standards of construction industry in Tanzania was carried out to ensure that construction of the WSP and Composting facility conforms with the required standards. This was done to ensure the safety of the proposed WSP and Composting facility.
- **Environmental considerations;** Environmental factors were also considered in the choice of construction materials, citing of other facilities such as WSP and composting facilities and choice of technologies. This was done in order to ensure that the project does not cause irreparable damage to the environment.
- **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 WSP and composting facility.
- **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-Tanga campus will 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 project.

6.9.2 No Project Alternative

The no project alternative entails retaining the current status quo (No construction of the proposed of WSP and composting facility at MU-Tanga 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 project 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 project has many potential benefits as compared to negative ones that can be easily mitigated.

6.9.3 Alternative Site

The EIA Guidelines, Annex 2 (1992) states that ―project options should be provided within the constraints of the aim and broad economic, technical and environmental factors‖. In the context of this study therefore the choice of site has been dictated by the following the factors:

- 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-Tanga Campus and their infrastructures.
- Currently the proponent does not have any other alternative site allocated for this project.
- The site is easily accessible from many parts of the Tanga City and is not connected to all utilities needed such as electricity and road infrastructure.
- Land is general flat therefore allow economical construction and design of building.
- The site is within the area where there are no any buildings in the surroundings.

Based on the above, the recommended alternative is the "Proposed Alternative" because it recognizes the viability and need for the proposed development, is designed to address environmental issues and concerns, meets all local regulatory requirements and supports communication and close relations during all stages of the development between the developers and the surrounding communities.

6.9.4 Water supply Alternative

Water supply from Tanga UWASA 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 project area for establishment of WSP and composting facility during construction period.

6.9.5 Alternative Sources for Construction Materials

Construction materials such as gravel, stones, aggregates, and sand will be sourced from existing authorized quarry sites. authorized quarry will only be considered if the existing ones are exhausted, and approval is obtained from regional and district authorities. Water needed for construction activities, especially for concrete preparation, may be obtained from groundwater or nearby streams, unless it is deemed unsuitable for the construction process.

6.9.6 Alternative of liquid waste management

During the construction phase, it is anticipated that the wastewater will be produced. The estimation is based on the assumption that an average individual generates approximately 90% of wastewater per day. Therefore, it is crucial to address the appropriate management and disposal of this wastewater volume. Given that the proposed area is still virgin land alternative options such as utilization of temporary pit latrine will be considered.

Use of wastewater stabilization ponds

Use of wastewater stabilization ponds is one of the commonly methods used of treating wastewater. Although this is one of the cheapest ways of treating wastewater, the method requires more space than the other WSP 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 stabilization 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;

Considering that the campus has enough space to accommodate the wastewater stabilization ponds away from other structures such as classrooms, students' hostels and the administration block, the alternative was preferred.

CHAPTER 7: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

7.1 Introduction

The Environmental and Social Management Plan (ESMP) is presented below in table 7.2. This ESMP for the proposed project and based on the assessment undertaken as part of the ESIA, a series of mitigation measures have been identified which aim to reduce and / or eliminate the predicted impacts of the project. These mitigation measures will be appropriately applied to the project mobilization, construction and operation, decommissioning and this management plan provides a strategic framework for their implementation. The Proponent and Contractor shall implement components relevant to design, mobilization of materials and machines and actual construction. The estimated costs for implementing the mitigation measures are just indicative. Additionally, the ESMP include an estimate of the costs of the measures so that the project proponent can budget the necessary funds. Appropriate bills of quantities should clearly give the actual figures. In any case the consultant used informed judgment to come up with these figures.

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 ESMPs 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 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 (Table 7.1).

MU Project Implementation Unit (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 MU-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.

Table 7.1: Roles with respective responsibilities

Function	Responsibilities
Project Implementation Unit (PIU)	○ Refer Table 3.5
NEMC	○ Refer Table 3.5
Design Consultants	○ Refer Table 3.5
Contractor	○ Refer Table 3.5
Supervision Engineer/Consultant	○ Refer Table 3.5

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 7.2: Proposed Environmental Social Management Plan (ESMP for planning phase, construction phase, demobilization phase, operation & maintenance phase and decommissioning phase.

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
MOBILIZATION AND CONSTRUCTION PHASE				
POSITIVE 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
2	Increased skills and impart knowledge to local communities	○ Implement a formal certification process for the skills acquired during the construction phase. ○ Partner with relevant vocational training institutions to accredit the skills gained by local residents. ○ Create community-based skills development centers equipped with necessary resources. ○ Foster long-term partnerships with local schools and educational institutions. ○ Develop curriculum enhancements related to environmental sustainability, wastewater management, and infrastructure development, ensuring a sustained educational impact beyond the construction phase. ○ Establish job placement programs to assist locals, especially students, in finding employment opportunities related to their newly acquired skills.	Contractor/ MU-PIU/ Consultant	N/A

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ Facilitate community-led initiatives that utilize the acquired skills for the betterment of the community. ○ Encourage the formation of local cooperatives or enterprises focused on environmental sustainability and infrastructure development. ○ Promote the integration of sustainable practices into the daily lives of community members. ○ Facilitate workshops and awareness campaigns on environmental stewardship, waste reduction, and responsible resource management.		
3	Business opportunities in supply of materials and utilities	○ 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.	Contractor/ MU-PIU/ Consultant	N/A Part of its project
NEGATIVE SOCIAL IMPACTS				
4	Influx of people/ labour	○ Enhance efforts to prioritize hiring from local communities (Gombero 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	Contractor/ MU-PIU/ Consultant	N/A Part of its project

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ 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		
5	Community Health, Safety and Security impact	○ Contractor should have registered and qualified health and safety personnel in the project during construction phase. ○ Develop and implement community health and safety management plan. ○ 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.	Contractor/ MU-PIU/ Consultant	5,000,000

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ 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	Health and Safety Risks	○ Implement strict health and safety protocols on the construction site, including the use of personal protective equipment (PPE), safety barriers, and proper signage. ○ Provide comprehensive safety training to all construction workers to ensure they are aware of potential risks and know how to mitigate them. ○ Contractor shall develop and implement C-ESMP ○ Develop and follow the established emergency response plan to handle accidents or health emergencies promptly. ○ Implement safety measures to protect nearby residents, including fencing, warning signs, and traffic diversions to keep them away from potentially hazardous areas. ○ 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. ○ 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.	Contractor/ MU-PIU/ Consultant	5,000,000
7	Traffic Congestion	○ Develop a comprehensive traffic management plan that outlines construction-related traffic routes, parking areas, and schedules to minimize congestion on local roads. ○ Identify alternate routes for construction-related traffic to minimize disruption to the regular commuting patterns of residents. ○ Consider providing shuttle services for construction workers to reduce the number of individual vehicles traveling to and from the construction site. ○ Inform local residents and commuters about the construction-related traffic plan and any temporary road closures through community outreach and signage.	Contractor/ MU-PIU/ Consultant	N/A Part of its project

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
8	Conflicts and grievances	○ Establish regular communication and engagement channels between the project management team and the local community to address concerns and grievances promptly. ○ Develop and communicate clear and accessible grievance mechanisms that allow community members to report issues related to construction worker behavior, dust, and other construction-related problems. ○ Contractor shall develop and implement GRM ○ Provide training to construction workers on respecting local customs, cultural norms, and codes of conduct. Sensitize them about the importance of maintaining a positive relationship with the community. ○ Implement effective dust and debris control measures to minimize the impact on the local community, such as using dust suppressants, erecting barriers, and scheduling construction activities during less sensitive times. ○ Appoint a community liaison officer responsible for addressing and resolving conflicts and grievances. This individual should serve as a point of contact between the community and the project. ○ Ensure that grievances are addressed promptly to prevent delays in project activities and mitigate potential cost increases.	Contractor/ MU-PIU/ Consultant	2,000,000
91	Gender discrimination	○ Develop and implement a gender equity policy that promotes equal employment opportunities for women and girls in the project. Ensure that this policy includes provisions to prevent sexual harassment and discrimination. ○ Conduct gender sensitivity training for all project staff, including male supervisors and decision-makers, to raise awareness about gender equality, respect, and the prevention of sexual harassment. ○ Establish confidential and safe reporting mechanisms for cases of sexual harassment and misconduct. Ensure that victims can report incidents without fear of retaliation. ○ Engage with local organizations and support networks to provide assistance and counseling for victims of sexual harassment. Create a safe and supportive environment for those affected. ○ Regularly monitor and enforce the gender equity policy to ensure that employment practices are in compliance. Take immediate action against any instances of sexual harassment or discrimination.	Contractor/ MU-PIU/ Consultant	2,000,000

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
10	Child labor	○ Implement rigorous age verification processes during the hiring of workers to ensure that no one under the age of 18 is employed in project activities. ○ Collaborate with local educational institutions and organizations to promote and support the education of children in the community, ensuring that they are not engaged in project-related work. ○ Conduct awareness campaigns within the community to educate parents and guardians about the importance of children's education and the risks associated with child labor. ○ Develop and enforce a comprehensive Labor Management Plan that explicitly prohibits child labor and outlines consequences for non-compliance.	Contractor/ MU-PIU/ Consultant	N/A Part of its project
11	Cultural and Social Disruption	○ Conduct a thorough cultural heritage assessment to identify and protect culturally significant sites. Adjust construction plans to avoid or minimize impacts on these sites. ○ Engage with local communities to understand their cultural and social practices and incorporate their input into the construction plan. Seek their consent and cooperation for any necessary relocations or disruptions. Note that, during the study there is big tunnel/Kichuguu in the project area where by community member from Gombero needs to preserve for future generation. ○ Train construction workers and project staff in cultural sensitivity to respect local customs and traditions.	Contractor/ MU-PIU/ Consultant	N/A Part of its project
NEGATIVE ENVIRONMENTAL IMPACTS				
12	Air pollution due to dust emission and gas from vehicle 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. ○ 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.	Contractor/ MU-PIU/ Consultant	

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ 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	Soil Erosion	○ Implement erosion control techniques such as silt fences, sediment basins, and erosion control mats to prevent soil erosion during construction. ○ Establish ground cover through the planting of grass or ground-covering plants in cleared areas to stabilize soil and reduce erosion. ○ Modify the construction site design to minimize soil disturbance and erosion risk. For example, use silt barriers around construction sites to contain sediment. ○ Construct sedimentation ponds to capture and treat runoff water, preventing sediment-laden water from reaching nearby water bodies. ○ Continuously monitor erosion control measures to ensure their effectiveness and make necessary adjustments as construction progresses. ○ Provide construction workers with training on erosion control practices to minimize soil erosion risks. ○ Conduct regular inspections to ensure that erosion control measures are being followed and that soil erosion is minimized.	Contractor/ MU-PIU/ Consultant	N/A Part of its project
14	Land and Vegetation Clearance	○ Implement selective land clearing rather than wholesale vegetation removal. Clear only the areas necessary for construction and infrastructure development. ○ Commit to a reforestation program by planting native tree species in cleared areas or nearby locations to offset the loss of vegetation. ○ Where feasible, consider transplanting mature or culturally significant trees and vegetation to other suitable areas	Contractor/ MU-PIU/ Consultant	N/A Part of its project
15	Water pollution due to oil/fuel leakage from vehicles and construction equipment	○ Implementing proper stormwater management practices, including the installation of sedimentation basins and sediment filters, can help prevent construction-related pollutants from reaching water bodies. ○ Proper storage and handling of construction chemicals and fuels, along with prompt cleanup of any spills, are also essential.	Contractor/ MU-PIU/ Consultant	1,000,000

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
16	Impact on climate change	○ Develop and implement an emissions reduction plan that includes measures to minimize emissions from construction equipment and vehicles. This may involve using cleaner fuel, employing emission controls, and optimizing equipment. ○ Encourage the use of alternative transportation methods for workers, such as carpooling or public transportation, to reduce the number of vehicles on-site. ○ Utilize energy-efficient and low-emission construction equipment and machinery to reduce greenhouse gas emissions during construction. ○ Implement a monitoring and reporting system to track emissions and air quality during construction. Take corrective actions if emissions exceed predefined limits. ○ Consider participating in carbon offset programs or initiatives to compensate for any unavoidable emissions associated with the project.	Contractor/ MU-PIU/ Consultant	N/A Part of its project
17	Increased Noise and vibration level	○ Vehicles carrying construction materials shall be restricted to work during night time only; ○ Implement a construction schedule that restricts noisy activities to specific times of the day when they are least likely to disturb residents, such as avoiding noisy work during nighttime or early morning hours. ○ Utilize construction equipment that produces less noise and dust when possible, and ensure that equipment is properly maintained to minimize noise emissions. ○ Establish effective communication channels with nearby residents to inform them of construction schedules and potential noise disruptions. ○ Implementing noise barriers, restricting construction hours, and using equipment with noise-reducing features can help mitigate the impacts of noise pollution. ○ Conducting vibration monitoring and implementing measures to minimize vibrations can also be beneficial. ○ Impact pile driving shall be avoided where possible in vibration sensitive areas; and, ○ Vibratory rollers and packers shall be avoided	Contractor/ MU-PIU/ Consultant	1,000,000
18	Generations of Solid and Liquid Wastes	○ All materials which can be reused shall be reused; ○ Develop and implement waste management plan. ○ Materials that cannot be reused shall be sent to Mpirani landfill; and ○ A hazardous materials inspection will be undertaken by an accredited consultant and a report issued. ○ Disposing of wastes at the designated places regularly ○ Site housekeeping to minimise solid and liquid wastes generated from construction and other related activities.	Contractor/ MU-PIU/ Consultant	2,000,000

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ All removed soil must be appropriately handled by either leveling it out or depositing it in low-lying or unused borrow areas. ○ Waste will be adequately gathered and transported away from the project site to the designated collection point at Mpirani landfill. ○ Biodegradable waste will be gathered and disposed of by an authorized contractor, then taken to Mpirani landfill. Plastics and other materials suitable for recycling will be collected separately and sent for recycling. ○ Consult Environmental Officer from Mkinga District Council about the suitable waste management. ○ Education and awareness programs for construction personnel and the local community can also contribute to minimizing the environmental and social impact of the project. Additionally, the construction project could invest in innovative technologies for waste management to enhance sustainability and reduce the overall impact on the environment.		
19	Loss of Visual Aesthetics	○ Avoidance and minimizing strategies for disposed wastes. ○ 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. ○ 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	Contractor/ MU-PIU/ Consultant	N/A
20	Loss of vegetations	○ Implement a comprehensive plan for revegetation and reforestation in and around the construction site to restore the indigenous vegetations. ○ Integrate green construction practices to minimize the need for extensive clearing of natural vegetation. ○ Explore alternative construction methods that reduce the ecological footprint.	Contractor/ MU-PIU/ Consultant	N/A Part of its project cost

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ 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 an 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.		
DEMOBILIZATION PHASE				
POSITIVE SOCIAL IMPACTS				
1	Reduced Traffic and Congestion	○ Establish a clear communication plan to inform the affected communities, Rubawa Primary School, and local residents about the demobilization schedule. ○ Coordinate with local authorities and relevant stakeholders to ensure smooth transitions and minimize any potential confusion during the demobilization process. ○ Develop a comprehensive traffic management plan for the demobilization phase, outlining designated routes and timings to minimize disruptions. ○ Utilize signage and communication tools to guide traffic away from construction areas and facilitate a smoother flow during the transition period. ○ Work with local transportation providers to offer alternative transportation options for students commuting to Rubawa Primary School and residents in the affected villages. ○ Develop contingency plans for potential emergencies or unexpected events that may impact traffic during the demobilization process. ○ Coordinate with local emergency services to ensure swift response and minimal disruption in case of unforeseen incidents. ○ Conduct community awareness programs to educate residents and students about the demobilization process and the expected reduction in traffic and congestion. ○ Encourage behavioral changes, such as staggered commuting times or carpooling initiatives, to optimize the use of available transportation resources.	Contractor/ MU-PIU/ Consultant	N/A Part of its project cost
2	Lessened Risk of Accidents	○ Establish a post-demobilization environmental monitoring program to assess the impact of the removal and disposal activities on air, soil, and water quality.	Contractor/ MU-PIU/ Consultant	N/A Part of its project cost

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ Regularly communicate monitoring results to the local communities to provide assurance of the ongoing safety of the environment. ○ Provide training opportunities for local community members to acquire skills related to environmental management and safety. ○ This capacity-building initiative can empower the local population to actively contribute to the long-term maintenance of a safe living environment. ○ Conduct training sessions for project personnel involved in the decommissioning process to enhance their awareness of potential hazards and safe handling practices. ○ Emphasize the importance of following established protocols and guidelines during the removal and disposal of hazardous materials to minimize the risk of accidents. ○ Organize awareness campaigns for the local communities, including students from Rubawa Primary School and residents of surrounding villages. ○ Communicate information about the demobilization process, potential hazards, and the safety measures being implemented to mitigate risks. ○ Develop and implement an emergency response plan that outlines procedures for addressing any unforeseen accidents or incidents during the demobilization phase. ○ Conduct drills and simulations to ensure that both project personnel and local communities are prepared to respond effectively to emergencies		
3	Minimized Soil Erosion	○ Promote the establishment of green infrastructure, such as community gardens or agroforestry projects, to further enhance soil stability. ○ Integrate sustainable land management practices to improve overall soil health and resilience. ○ Implement water management practices that reduce surface runoff, such as the creation of swales or retention ponds. ○ Incorporate rainwater harvesting systems to reduce the impact of heavy rainfall on erosion-prone areas. ○ Provide training to local farmers on sustainable agricultural practices that minimize soil disturbance and erosion. ○ Encourage the use of cover crops and crop rotation to enhance soil structure and reduce erosion risks. ○ Utilize bioengineering techniques such as the planting of erosion-resistant plant species with deep root systems.	Contractor/ MU-PIU/ Consultant	N/A Part of its project cost
NEGATIVE SOCIAL IMPACT				

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
4	Loss of Employment	○ Establish a transition assistance program to help local workers who will lose their jobs during demobilization. ○ Provide job counseling, training, and support in seeking alternative employment opportunities within the community. ○ Consider offering priority hiring for any ongoing maintenance or monitoring activities related to the WSP and composting facility.	Contractor/ MU-PIU/ Consultant	N/A Part of its project cost
5	Impact due to Health and Safety Risks	○ Conduct specialized training sessions for all demobilization personnel on health and safety protocols. ○ Ensure that workers are aware of potential hazards and the proper procedures for handling hazardous substances. ○ Contractor shall develop and implement C-ESMP ○ Mandate the use of appropriate PPE, including gloves, masks, and safety goggles, for all personnel involved in the demobilization process. ○ Provide adequate training on the correct usage, maintenance, and disposal of PPE. ○ Develop a detailed inventory of hazardous substances and implement strict control measures for their handling and disposal. ○ Use spill containment and cleanup kits in strategic locations to respond promptly to any accidental releases. ○ Install air quality monitoring stations in and around the project site to track potential pollutants. ○ Establish thresholds for air quality parameters and halt demobilization activities if limits are exceeded. ○ Implement measures to prevent the release of contaminants into water sources. ○ Regularly monitor water quality downstream from the project site to ensure compliance with established standards. ○ Conduct community awareness campaigns to educate residents about potential health risks and preventive measures. ○ Establish communication channels for reporting any health-related concerns.	Contractor/ MU-PIU/ Consultant	6,000,000

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ Develop and regularly practice an emergency response plan to address any unforeseen health and safety incidents. ○ Ensure that local emergency services are aware of the project and can provide timely assistance if needed.		
NEGATIVE ENVIRONMENTAL IMPACT				
6	Potential for Soil Contamination	○ Ensure the wastewater treatment process is efficient to minimize the discharge of pollutants into the soil. ○ Regularly monitor and upgrade the treatment systems to meet or exceed environmental standards. ○ Establish buffer zones between the project site and sensitive areas like Rubawa Primary School and surrounding villages. ○ These zones can act as a barrier to reduce the direct impact of any potential soil contamination. ○ Implement advanced containment systems to prevent leaks or spills of wastewater into the soil. ○ Install leak detection systems to identify and address any issues promptly. ○ Education and Awareness Programs: ○ Conduct awareness programs for the local communities, emphasizing the importance of proper waste disposal and the potential impacts of soil contamination. ○ Involve the students, residents, and local leaders in workshops to promote responsible environmental practices.	Contractor/ MU-PIU/ Consultant	N/A Part of its project cost
7	Disruption to Local Ecosystems	○ Develop a plan for ecosystem restoration that includes re-vegetation and soil conservation measures. ○ Implement erosion control measures to prevent soil compaction and damage to vegetation during demobilization activities. ○ Monitor the restored ecosystem over time to ensure it returns to its natural state. ○ Conduct regular monitoring of water bodies downstream to assess the impact on aquatic life. ○ Implement buffer zones or constructed wetlands to treat effluent before it enters natural water bodies. ○ Promote environmental conservation through habitat restoration and enhancement initiatives.	Contractor/ MU-PIU/ Consultant	N/A Part of its project cost

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
8	Waste Generation	○ Develop a comprehensive waste management plan for demobilization that includes the proper sorting, disposal, and recycling of waste materials. ○ Prioritize the safe disposal of hazardous materials in accordance with environmental regulations. ○ Engage with local waste disposal facilities and ensure that waste is transported and disposed of responsibly. ○ Promote reuse and recycling of construction materials whenever feasible to minimize waste generation.	Contractor/ MU-PIU/ Consultant	N/A Part of its project cost
OPERATIONS AND MAINTENANCE PHASE				
POSITIVE SOCIAL IMPACTS				
9	Disruption of Social Economic Activities	○ Establish a community liaison or communication mechanism to keep nearby communities informed about the project's schedule and potential disruptions. ○ Coordinate construction and maintenance activities to minimize disruptions during peak economic or social activities.	MU-PIU	N/A Part of its project cost
10	Improved Health and Safety of people	○ Implement a comprehensive maintenance plan to ensure the continued effectiveness of the wastewater stabilization pond and composting facility. ○ Establish routine monitoring systems to promptly identify and address any potential issues related to facility operation. ○ Conduct workshops and training programs for local communities on proper waste management practices, emphasizing the importance of continued adherence to guidelines. ○ Promote awareness about the link between proper waste disposal and improved health, encouraging sustainable behaviors. ○ Collaborate with local health authorities to establish ongoing health programs that address the specific needs of the communities. ○ Consider projects like the construction of sanitation facilities and access to clean water sources for a holistic approach to public health. ○ Focus on preventive healthcare measures, such as vaccination campaigns and regular health check-ups. ○ Encourage research initiatives to explore innovative technologies and practices that can enhance the effectiveness of wastewater treatment and composting. ○ Foster collaboration with academic institutions for continuous improvement and adaptation of best practices.	MU-PIU	N/A Part of its project cost

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ Develop and communicate emergency response plans in case of unforeseen incidents or system failures to minimize potential health and safety risks. ○ Conduct drills and simulations to ensure that local authorities and communities are well-prepared for emergencies. ○ Consider the establishment of local committees or partnerships to oversee ongoing operations and community involvement.		
11	Employment Opportunities	○ Collaborate with local schools to introduce educational initiatives related to wastewater management, environmental conservation, and sustainable practices. This can create a pipeline of skilled individuals interested in contributing to the project. ○ Provide support for the development of small businesses that can cater to the needs of the facility, such as catering services, transportation, and maintenance. This can stimulate local economic growth and create additional indirect employment opportunities. ○ Implement employee well-being programs to ensure a positive working environment. This can include health and safety initiatives, recreational activities, and ongoing training. ○ Prioritize hiring from the local community to ensure that the immediate residents benefit directly from the project. This can be achieved through collaboration with local employment agencies, community leaders, and educational institutions. Conduct awareness campaigns and informational sessions to inform the local community, particularly students and residents, about the employment opportunities available. This can include workshops, career fairs, and information sessions at local schools to prepare students for potential future roles.	MU-PIU	N/A Part of its project cost
12	Educational Opportunities	○ Collaborate with local schools and educational institutions to expand the reach of educational programs beyond the initially identified villages. ○ Introduce new topics and modules based on the evolving needs and interests of the community. ○ Establish regular community meetings to involve local residents in the planning and execution of educational programs. ○ Encourage active participation from community members in workshops and training sessions to foster a sense of ownership and sustainability. ○ Develop online resources and materials to ensure that educational content remains accessible even in the absence of physical workshops or training sessions.	MU-PIU	N/A Part of its project cost

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ Implement a contingency plan to continue educational outreach through virtual platforms in case on-site activities are disrupted. ○ Introduce skill development programs that empower community members with practical skills related to environmental science, water management, and sustainable agriculture, ensuring they can continue benefiting even if formal educational programs are temporarily halted. ○ Regularly assess the effectiveness of educational initiatives and make necessary adjustments based on feedback and changing circumstances. ○ Stay informed about advancements in environmental science, water management, and sustainable agriculture to provide cutting-edge knowledge to students and community members.		
13	Improved Water Quality	○ Provide training programs for local personnel involved in the operation and maintenance of the facilities to enhance their skills and knowledge in water quality management. ○ Collaborate with local educational institutions to offer workshops and seminars on sustainable water management practices. ○ Explore and implement innovative technologies or upgrades that could enhance the efficiency of the wastewater treatment processes, leading to even higher water quality standards. ○ Regularly review advancements in wastewater treatment technology and consider their applicability to the project. ○ Integrate green infrastructure elements around the project site to promote natural filtration and absorption of pollutants. ○ Utilize appropriate vegetation and landscaping techniques to prevent soil erosion and runoff, further safeguarding water quality. ○ Establish partnerships with local water resource management authorities to ensure coordinated efforts in maintaining and improving water quality. ○ Participate in regional water quality monitoring programs to contribute valuable data and insights to broader environmental initiatives. ○ Maintain open communication with stakeholders, including local communities, government agencies, and non-governmental organizations, to gather feedback and address concerns related to water quality. ○ Organize periodic meetings to update stakeholders on the project's performance and seek input for continuous improvement.	MU-PIU	N/A Part of its project cost

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
14	Improved Sanitation	○ Integrate green infrastructure around the WSP and composting facility to enhance the aesthetic appeal of the area. ○ Plant native vegetation to create a visually pleasing environment, while also contributing to natural filtration and habitat improvement. ○ Designate specific areas around the facilities for recreational purposes, such as parks or green spaces, to promote community engagement and well-being. ○ Provide seating areas, walking paths, or other amenities that encourage the use of the space for leisure and community gatherings. ○ Implement community gardens or agricultural projects utilizing the compost produced from the facility to promote sustainable agriculture and community self-sufficiency. ○ Involve local residents in the cultivation of crops, fostering a sense of pride and connection to the improved sanitation infrastructure. ○ Collaborate with local health authorities to develop and implement public health programs that leverage the improved sanitation conditions. ○ Focus on disease prevention, health education, and regular health check-ups to ensure the long-term well-being of the community. ○ Develop and implement educational programs to raise awareness about proper sanitation practices and the importance of maintaining the wastewater stabilization pond and composting facility. ○ Conduct workshops and training sessions for the local community, with a focus on hygiene, waste disposal, and the benefits of the implemented facilities ○ Establish a comprehensive maintenance schedule for the wastewater stabilization pond and composting facility to ensure their efficient operation. ○ Implement regular monitoring and inspection programs to identify and address any issues promptly, preventing potential environmental and social impacts.	MU-PIU	N/A Part of its project cost
15	Increase soil fertility due to the generation of natural fertilizer	○ Foster strong relationships with local communities, schools, and farmers through ongoing engagement and communication to address any concerns or feedback related to the project. ○ Establish a community liaison or advisory committee to facilitate communication and collaboration between the project team and local stakeholders. ○ Explore opportunities to expand the reach of the natural fertilizer to additional nearby communities, schools, or farmers who may also benefit from improved soil fertility.	MU-PIU	N/A Part of its project cost

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ Encourage knowledge sharing among beneficiaries to promote a sense of community and collective responsibility for the sustainable use of natural fertilizer. ○ Invest in research and development initiatives to explore innovative methods of composting and natural fertilizer production, aiming to enhance the efficiency and environmental sustainability of the process. ○ Collaborate with local agricultural research institutions to continuously improve composting techniques and the quality of natural fertilizer. ○ Collaborate with local agricultural extension services and government programs to integrate the use of natural fertilizer into existing agricultural practices and initiatives. ○ Explore partnerships with agricultural cooperatives to facilitate the distribution and application of natural fertilizer among local farmers. ○ Establish a comprehensive monitoring program to regularly assess the effectiveness of the composting facility and wastewater stabilization pond in generating natural fertilizer. ○ Implement a routine maintenance schedule to ensure the proper functioning of the facility, preventing potential issues that may impact the quality of the produced compost.		
16	Reduced Odor and Aesthetics	○ Implement landscaping and beautification projects around the project site and in the nearby villages. This can include planting flowers, maintaining green spaces, and incorporating aesthetically pleasing elements to improve the overall visual appeal. ○ Engage with the local communities in Pangarawe, Gombero, Vunde Manyinyi, Jirihini, Kichangani, and Dima villages to involve them in maintaining the beautification efforts. Community members can contribute to planting and maintaining green spaces. ○ Conduct public awareness campaigns to educate the local communities about the importance of proper waste management and the positive impact it has on reducing odors and improving aesthetics. This can foster a sense of responsibility among residents. ○ Explore the incorporation of green infrastructure elements, such as rain gardens or permeable surfaces, to enhance the overall environmental sustainability of the project area.	MU-PIU	N/A Part of its project cost
17	Water Conservation	○ Design and maintain the project area with eco-friendly landscaping practices that minimize water requirements.	MU-PIU	N/A

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ Utilize native and drought-resistant plants to reduce the need for irrigation. ○ Incorporate green infrastructure elements, such as vegetated swales and permeable surfaces, to enhance water absorption and reduce runoff. ○ Establish a sustainable stormwater management plan to prevent water wastage. ○ Implement wastewater recycling systems within the project area to reuse treated water for non-potable purposes. ○ Ensure that recycled water meets quality standards and poses no risk to the environment or public health. ○ Build the capacity of local communities to manage and maintain water conservation infrastructure. ○ Provide training programs on water resource management, emphasizing long-term sustainability. ○ Establish a monitoring and evaluation system to assess the effectiveness of water conservation measures over time. ○ Adjust strategies based on the results to continuously improve the project's impact on water conservation. ○ Work collaboratively with local water authorities to ensure the alignment of the project with regional and national water conservation goals.		Part of its project cost
NEGATIE ENVIRONMENTAL IMPACTS				
18	Foul smell (Odor)	○ Design and construct the WSP to minimize odor emissions, such as using baffles or covers or vegetation around the WSP to reduce the release of odorous gases. ○ Implement regular maintenance and sludge removal to prevent excessive organic matter accumulation. ○ Conduct odor control measures, such as using odor-neutralizing agents or planting vegetation around the ponds to absorb odors. ○ Implement advanced odor control technologies such as biofilters, activated carbon filters, or other proven methods to minimize and control odors emitted from the wastewater stabilization pond and composting facility. ○ Establish a regular inspection and maintenance schedule for all facilities and equipment to identify and address any potential sources of odors promptly. This will prevent the buildup of odorous substances. ○ Consider covering and sealing certain components of the facilities, especially those prone to emitting odors. This can include covering composting piles and using sealing systems for wastewater stabilization ponds.	MU-PIU	2,000,000

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		o Create vegetative buffer zones using native plants and trees around the facilities. Vegetation can act as a natural barrier, helping to absorb odors and enhance the overall aesthetics of the area.		
19	Mosquito Breeding	o Implement mosquito control measures such as the use of larvicides or biological controls to manage mosquito populations and to prevent mosquito breeding in and around the wastewater stabilization ponds. o Maintain proper pond operation and maintenance practices to reduce stagnant water areas that are conducive to mosquito breeding. o Educate the local community about personal protective measures to reduce the risk of diseases transmitted by mosquitoes. o Implement proper maintenance of the ponds to minimize stagnant water areas and control the growth of mosquito larvae. o Use larvicides or biological controls to manage mosquito populations. o Establish proper solid waste management practices to minimize food sources for flies.	MU-PIU	4,000,000
20	Water pollution	o Implement a comprehensive water quality monitoring program to regularly assess the effectiveness of the wastewater stabilization pond and composting facility. o Conduct routine tests for key water quality parameters, including chemical oxygen demand (COD), biochemical oxygen demand (BOD), total suspended solids (TSS), and nutrient levels o Develop and implement a detailed operation and maintenance plan for the wastewater stabilization pond and composting facility to ensure optimal performance. o Regularly inspect and maintain equipment, infrastructure, and treatment processes to prevent malfunctions and minimize the risk of water contamination. o Develop an emergency response plan to address any unexpected events or malfunctions that could potentially impact water quality. o Train personnel on emergency response procedures and establish communication channels with relevant authorities. o Conduct awareness campaigns to educate the local communities, especially students and residents, about the importance of water quality and the role of the project in maintaining clean water. o Encourage community involvement in monitoring water quality and reporting any concerns promptly.	MU-PIU	5,000,000

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ Install tertiary treatment processes if necessary to further enhance the quality of the effluent. ○ Invest in additional treatment processes or upgrades to reduce pollutant levels in the effluent. ○ Develop a contingency plan for addressing any unforeseen discharges or violations promptly.		
21	Overflowing of sludge into the surrounding environment	○ Implement advanced design features such as overflow diversion channels and barriers to contain and redirect sludge in case of overflow. ○ Construct sludge storage facilities with adequate capacity to handle excess sludge during peak periods. ○ Install real-time monitoring systems to detect sludge levels and anticipate potential overflow. ○ Implement an automated early warning system to alert operators and relevant authorities in the event of abnormal sludge accumulation. ○ Establish a routine maintenance schedule for inspecting and cleaning sludge management infrastructure. ○ Conduct regular inspections of containment structures, pipes, and valves to identify and address potential issues proactively. ○ Conduct awareness programs for local communities about the risks associated with sludge overflow. ○ Foster community participation in monitoring activities and reporting unusual observations. ○ Develop and implement a comprehensive emergency response plan outlining procedures to be followed in the event of a sludge overflow. ○ Train facility operators and local authorities on emergency response protocols. ○ Collaborate with local authorities to incorporate the project into regional land-use plans, ensuring that potential impacts on agriculture and water sources are considered. ○ Avoid locating the facility in areas with high agricultural significance. ○ Integrate green infrastructure, such as vegetative buffers and wetlands, to naturally filter and absorb potential contaminants from sludge before reaching agricultural lands or water sources. ○ Establish mechanisms for ongoing communication with affected communities through regular meetings and feedback sessions.	MU-PIU	2,000,000

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ Develop a grievance mechanism to address concerns raised by community members promptly. ○ Provide training to local farmers on sustainable agricultural practices and soil conservation to minimize the impact of potential sludge contamination. ○ Enhance the capacity of local water management committees to monitor water quality. ○ Support research initiatives to explore innovative technologies for sludge management that minimize environmental impacts. ○ Stay informed about advancements in wastewater treatment and implement relevant upgrades as necessary.		
22	Ecological Impact	○ Conduct regular ecological assessments to monitor the health of nearby aquatic ecosystems. ○ Implement habitat restoration or enhancement programs if adverse effects on aquatic organisms are identified. ○ Collaborate with relevant environmental agencies to ensure compliance with ecological protection regulations.	MU-PIU	2,000,000
DECOMMISSIONING PHASE				
NEGATIVE SOCIAL IMPACT				
1	Loss of employment and business opportunities	○ 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	Contractor/ MU-PIU/ Consultant	N/A

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
2	Health and Safety Concerns	○ Conduct regular and transparent communication with the affected communities to keep them informed about the decommissioning process, potential risks, and mitigation measures. ○ Establish a community liaison officer to address concerns, gather feedback, and facilitate communication between the project team and the community. ○ Implement a robust health and safety monitoring program to assess air and water quality, soil contamination, and any potential health risks during decommissioning activities. ○ Utilize real-time monitoring systems and involve local health authorities to ensure prompt response to any emerging issues. ○ Provide adequate personal protective equipment (PPE) to workers involved in decommissioning activities to minimize their exposure to hazardous materials. ○ Conduct regular training sessions for workers on the proper use of PPE and safe handling of materials to prevent accidents and exposure. ○ Develop and communicate a detailed emergency response plan to address any unforeseen incidents during decommissioning, ensuring quick and effective response to protect both workers and the surrounding community. ○ Conduct emergency drills and simulations to prepare the local community and response teams for potential health and safety emergencies. ○ Implement measures to control dust emissions during decommissioning, such as the use of water spraying, dust suppressants, and covering materials to minimize the inhalation of harmful particles. ○ Install air quality monitoring stations to continuously assess the impact of decommissioning activities on the local air quality. ○ Implement erosion control measures, such as the use of silt fences, vegetation cover, and sediment basins, to prevent soil disturbance and sedimentation in nearby water bodies. ○ Regularly inspect and maintain erosion control structures to ensure their effectiveness throughout the decommissioning process. ○ Develop a systematic waste management plan for the proper disposal of decommissioned materials, hazardous waste, and other by-products. ○ Prioritize recycling and environmentally friendly disposal methods to minimize the impact on the local environment.	Contractor/ MU-PIU/ Consultant	4,000,000

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ Establish a post-decommissioning monitoring program to assess the long-term effects on health and safety in the affected communities. ○ Implement corrective actions as necessary based on the findings of post-decommissioning monitoring to address any lingering issues.		
NEGATIVE ENVIRONMENTAL IMPACTS				
3	Release of Contaminants	○ Develop a comprehensive plan for handling and disposing of contaminants from the WSP. This plan should include measures for the safe removal, transportation, and disposal of hazardous materials. ○ Implement containment measures, such as impermeable liners or barriers, to prevent the spread of contaminants during decommissioning. Continuously monitor water quality in nearby water bodies to detect any signs of contamination promptly.	Contractor/ MU-PIU/ Consultant	5,000,000
4	Water pollution	○ Implement a comprehensive water quality monitoring program to regularly assess the effectiveness of the wastewater stabilization pond and composting facility. ○ Conduct routine tests for key water quality parameters, including chemical oxygen demand (COD), biochemical oxygen demand (BOD), total suspended solids (TSS), and nutrient levels. ○ Develop and implement a detailed operation and maintenance plan for the wastewater stabilization pond and composting facility to ensure optimal performance. ○ Regularly inspect and maintain equipment, infrastructure, and treatment processes to prevent malfunctions and minimize the risk of water contamination. ○ Develop an emergency response plan to address any unexpected events or malfunctions that could potentially impact water quality. ○ Train personnel on emergency response procedures and establish communication channels with relevant authorities. ○ Conduct awareness campaigns to educate the local communities, especially students and residents, about the importance of water quality and the role of the project in maintaining clean water. ○ Encourage community involvement in monitoring water quality and reporting any concerns promptly. ○ Install tertiary treatment processes if necessary to further enhance the quality of the effluent. ○ Invest in additional treatment processes or upgrades to reduce pollutant levels in the effluent.	Contractor/ MU-PIU/ Consultant	2,000,000

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ Develop a contingency plan for addressing any unforeseen discharges or violations promptly.		
5	Soil pollution	○ Conduct thorough soil characterization before decommissioning activities to identify existing pollutants. ○ Implement a robust monitoring program during decommissioning to promptly detect any increase in soil pollution levels. ○ Segregate and properly manage different types of waste materials to minimize the potential for soil contamination. ○ Ensure that hazardous materials are securely contained, transported, and disposed of in accordance with environmental regulations. ○ Implement erosion control measures to prevent soil erosion during decommissioning activities. ○ Use sedimentation ponds or barriers to capture sediments and prevent their migration into nearby areas. ○ Establish vegetative cover in the decommissioned areas to stabilize the soil and prevent erosion. ○ Use appropriate plant species that can assist in phytoremediation, helping to absorb and mitigate soil contaminants. ○ Develop and implement a soil remediation plan if contamination is detected during decommissioning. ○ Utilize appropriate remediation technologies such as bioremediation or soil washing to restore soil quality. ○ Conduct community awareness programs to inform residents of potential risks and mitigation measures. ○ Encourage community participation in monitoring and reporting any observed changes in soil quality. ○ Introduce alternative and sustainable agricultural practices to affected communities to mitigate the impact on agricultural productivity. ○ Provide training and resources for farmers to adopt soil conservation techniques. ○ Implement measures to safeguard water quality, as soil pollution can lead to contamination of water sources. ○ Monitor and manage runoff to prevent pollutants from reaching water bodies. ○ Ensure strict adherence to environmental regulations and standards during the decommissioning phase.	Contractor/ MU-PIU/ Consultant	2,000,000

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ Obtain necessary permits and approvals for decommissioning activities. ○ Establish a long-term monitoring program after decommissioning to assess the effectiveness of mitigation measures. ○ Provide regular reports to relevant authorities and stakeholders on the status of soil quality and the success of mitigation efforts.		
6	Air pollution	○ Install and utilize effective emission control systems during the decommissioning process to capture and treat airborne pollutants. This may include the use of filters, scrubbers, and other technologies to minimize the release of contaminants into the air. ○ Implement a comprehensive waste segregation plan to separate materials that can be recycled from those that need disposal. Recycling reduces the need for combustion, minimizing air pollution associated with the burning of waste materials. ○ Explore alternative disposal methods, such as incineration with energy recovery or safe burial, that minimize the release of pollutants into the air. This may involve choosing methods that have lower environmental impacts and are consistent with regulatory standards. ○ Implement dust control measures, including the use of water sprays or other suppressants, to minimize the dispersal of particulate matter during the decommissioning activities. ○ Prioritize the prompt removal and safe disposal of hazardous materials to prevent their release into the air during decommissioning. ○ Establish a robust environmental monitoring program to regularly assess air quality during the decommissioning phase. This will allow for early detection of any deviations from acceptable standards, enabling prompt corrective actions.	Contractor/ MU-PIU/ Consultant	2,000,000
7	Noise and vibration pollution from demolishing works	○ 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.	Contractor/ MU-PIU/ Consultant	4,000,000

S/N	Impacts	Mitigation/Enhancement Measure	Responsible part	Estimated cost (TZS)
		○ 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		
Total cost of mitigation measure (TZS)				**58,0000,000**

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 9.1 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 proponent are to be included in the project cost.

8.1.1 Objectives of EMP

The EMP applies to and will be implemented throughout all phases of the project: mobilization, construction, operation, and decommissioning. The objective of the ESMP is to set out clearly the key components of environmental and socio-economic management for the proposed project and thereby ensure that the following concepts are realized throughout the mobilization, construction, operation, and decommissioning.

- Negative impacts on the physical, biological and socio-economic environments are mitigated.
- Benefits that will arise from the development of the proposed project are enhanced;
- Support smooth implementation of project with minimum losses to environmental and social infrastructure.
- Compliance and guided by National, International laws, standards and guidelines e.g. effluents standards, noise level standards, occupational and safety standards etc. and best practice is achieved; and

- Good will and good relations with communities, and governments at local and national levels are maintained.

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 demobilization phase. Some monitoring may have to continue even beyond demobilization 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 9.1) 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 mobilization/planning phase, construction phase, demobilization phase, operation phase and decommissioning phase

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
MOBILIZATION AND CONSTRUCTION PHASE							
Influx of people/ labour	Number of people	○ Measure changes in the local population density during the mobilization and construction phase. ○ Monitor the demand for housing and assess the availability of accommodation for incoming workers. ○ Ensure that the influx does not lead to overcrowding or inadequate living conditions. ○ Monitor changes in traffic patterns and transportation infrastructure during construction. ○ Track the number of local residents employed during the construction phase. ○ Track the use of natural resources (water, energy, etc.) during the construction phase. ○ Monitor the capacity of local social services (healthcare, education, etc.) to accommodate the increased population. ○ Address any strain on existing social services to ensure the well-being of both the existing and incoming population.	Weekly	Inspection	N/A	Contractor/ MU-PIU/ Consultant/ LGA	1,000,000
Community Health, Safety and Security impact	Inspection of the emergency and detection	○ Number and nature of incidents related to health, safety, or security within the community. ○ Severity and response time to address reported incidents.	Weekly	Inspection	N/A	Contractor/ MU-PIU/ Consultant/ LGA	3,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
	systems; - Inspection of available health facility in the dispensary	○ Number and nature of incidents related to health, safety, or security within the community. ○ Severity and response time to address reported incidents. ○ Number and nature of incidents related to health, safety, or security within the community. ○ Severity and response time to address reported incidents. ○ Number and nature of incidents related to health, safety, or security within the community. ○ Severity and response time to address reported incidents. ○ Establishment of a feedback mechanism for the community to express concerns related to health, safety, and security. And analysis of feedback received, and actions taken in response					
Health and Safety Risks	- Number and type of safety equipment such as mask, helmet gloves and earplugs	○ Ongoing surveillance of construction activities to identify and mitigate potential hazards to both workers and the surrounding community. ○ Regular site inspections, safety audits, and the enforcement of safety protocols to ensure compliance with health and safety standards. ○ Emergency response plans should be in place, and incidents should be documented and analyzed for continuous improvement.	Quarterly	Inspection; Voluntary testing;	WHO/OSHA standards	Contractor/ MU-PIU/ Consultant	5,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
		○ Community engagement should be implemented, with feedback mechanisms to address any health and safety concerns raised by local residents					
Traffic Congestion	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 mobilization phase.	Daily	Observation	No traffic/Accidents	Contractor/ MU-PIU/ Consultant	2,000,000
Conflicts and grievances	Number of meetings held during the mobilization Phase and throughout the project phases -Number of complains and Incidences	○ Regular monitoring of community feedback, conducting stakeholder consultations, and maintaining open communication channels to promptly address and resolve any disputes. ○ The monitoring team will document and analyze reported conflicts, implementing mitigation measures as necessary, and ensuring that grievance resolution is fair, transparent, and culturally sensitive	Weekly	-Observation of records of complains -Analyse records of workers and community grievance	No complains	Contractor/ MU-PIU/ Consultant	2,000,000
Gender discrimination	Number of men and women employed	○ Ongoing data collection on the number of male and female workers employed, their job roles, and the wages they receive.	Monthly	Observation of records of complains	No Violations and harassments to vulnerable groups	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
		○ Assessing the working conditions to guarantee a safe and inclusive environment for all genders. ○ Periodic reviews should be conducted to identify any gender-specific challenges or issues that may arise during the construction activities					
Child labor	-Adherence to and implementation of child labor policies on the construction site. -Verification of the age of all workers on the construction site. -Availability and participation of school-aged children in	○ Regular audits and assessments to verify compliance with local and international child labor regulations. ○ Regular checks and documentation of workers' ages through official identification documents. ○ Regular monitoring of the enrollment and attendance of children in nearby schools during the construction phase. ○ Regular assessment of the effectiveness of awareness campaigns within the project's vicinity. ○ Evaluation of the incorporation and effectiveness of child labor prevention training in the overall workforce education.		Inspection	Compliance of local and international child labor regulations	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
	educational programs.						
Air pollution due to dust emission and gas from vehicle emission	Measurement of ambient gaseous (Noxious gasses (CO, CO_2, NO, NO_X, SO_X)) and particulate matter (PM_{10} & $PM_{2.5}$)	○ The continuous measurement and analysis of emissions from construction activities that may release noxious gases into the atmosphere. ○ 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. ○ 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. ○ 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	Quarterly	Measurement of ambient gaseous	TBS / WHO Standard	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
		should be implemented to mitigate the impact, and adjustments to construction practices may be made to minimize air pollution.					
Soil Erosion	-Regular checks on the effectiveness of sedimentation basins and barriers - Assessment of erosion control measures in place (e.g., check dams, silt fences, cover crops). - Participation in training programs on erosion control for construction personnel.	○ Sedimentation basins and barriers are installed to trap and control sediment runoff. Regular inspections will ensure they are functioning as intended. ○ Ensure that erosion control measures are installed and properly maintained to minimize soil erosion during construction activities. ○ Monitoring the establishment and maintenance of vegetative cover in disturbed areas. ○ Regular inspections by environmental and construction management teams to identify and address any erosion issues promptly. ○ Construction contractors should provide regular reports on the status of erosion and sedimentation control measures, including any incidents and corrective actions taken.	Quarterly	Inspection	Loose soils and bare soils protected from erosion	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
Land and Vegetation Clearance	Area cleared	○ Reforestation and Afforestation	Once upon Decommissioning	Observation	N/A	Contractor/ MU-PIU/ Consultant	2,000,000
Water pollution due to oil/fuel leakage from vehicles and construction equipment	-Number of reported oil and fuel spill incidents. - Volume of oil and fuel spilled. - Time taken to respond to and address oil and fuel spill incidents. -Percentage of oil and fuel cleaned up after a spill incident.	○ Regular reporting and recording of any spill incidents ○ Regular assessment and measurement of the quantity of spilled oil/fuel in case of incidents. ○ Measure the time between the occurrence of a spill incident and the initiation of response and cleanup activities. ○ Assess the effectiveness of response measures in terms of the percentage of spilled oil/fuel successfully cleaned up.	Daily	Observation	No spillage of oil/fuel	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
Noise generation	Day and night noise levels	○ 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)	○ 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. ○ 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.	Weekly	Observation	Environmental compliance with The Environmental Management (Solid Waste Management) Regulation, 2009 as amended in 2016	Contractor/ MU-PIU/ Consultant	3,000,000
OPERATIONAL AND MAINTENANCE PHASE							
Foul smell (Odor)	Foul smell	○ Define a scale to measure the intensity of foul smells emitted from the wastewater stabilization pond and composting facility.	Quarterly	Observation/Inspection	No smell	MU-PIU	2,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
		○ Establish monitoring points at different locations within and around the facility to assess the dispersion of odors. ○ Define a scale to measure the intensity of foul smells emitted from the wastewater stabilization pond and composting facility. ○ Establish monitoring points at different locations within and around the facility to assess the dispersion of odors. ○ Establish a mechanism for the community and nearby residents to report instances of foul smells. ○ Keep a record of complaints and feedback to identify trends and areas that may require additional mitigation measures. ○ Conduct regular assessments to identify specific sources of odors within the wastewater stabilization pond and composting facility.					
Mosquito Breeding		○ Establish a baseline mosquito population density in the project area before the facility becomes operational. ○ Regularly assess and monitor potential mosquito breeding habitats in and around the wastewater stabilization pond and composting facility. ○ Identify and address any stagnant water bodies, pools, or areas with poor drainage that could serve as breeding grounds for mosquitoes.	Quarterly	Observation/Inspection	No mosquito nuisance	MU-PIU	2,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
		○ Conduct routine water quality tests in the stabilization pond to ensure that the water is treated effectively and does not create suitable conditions for mosquito breeding.					
Water pollution	Overflow and measurement of Water parameter (BOD, COD, TSS, NH3-N, Total Phosphorus (TP), pH, Dissolved Oxygen, Turbidity, Chlorine & Heavy metal	○ Regular testing for COD levels in the effluent to measure the amount of organic pollutants present. ○ Monitoring BOD levels to assess the impact on aquatic ecosystems. ○ Measuring the concentration of suspended solids in the effluent. ○ Monitoring concentrations of nitrogen and phosphorus, common pollutants that contribute to nutrient pollution. ○ Regular measurement of pH to ensure it falls within acceptable ranges, preventing adverse effects on aquatic life. ○ Monitoring the flow rate of wastewater through the system to ensure it aligns with design parameters and prevents overloading. ○ Monitoring the time, it takes to respond to and address equipment failures to minimize potential environmental impacts. ○ Establishing a mechanism for community members to report any observed issues related to water pollution and addressing these concerns promptly.	Quarterly	Measurement of treated effluent	Physical Components Below 30 mg/L of BOD5 at 20°C using TZS 861 (Part 3):2006 Five-day BOD method 100mg/L TSS using TZA 861(Part 1):2006 Gravimetric Method pH range of 6.5-8.5 using TZS 861(Part2):2006 – Electrometric Method Inorganic Components Below 0.1mg/L Pb using TZS 861(Part 7):2006 Flame Atomic Absorption Spectrometry - Below 500mg/L	MU-PIU	6,000,000

Potential Impacts	Monitoring Indicator	Monitoring Action	Monitoring Frequency	Means of verification	Target level/ Standards	Responsibility	Estimated cost (TZS) per annum
Overflowing of sludge into the surrounding environment	Overflow	○ Monitor the effectiveness of overflow prevention measures such as berms, diversion channels, and other engineering controls. ○ Regularly inspect and maintain these measures to ensure they remain functional and can prevent sludge overflow into the surrounding environment.	Annually	Observation/Inspection	N/A	MU-PIU	5,000,000
DECOMMISSIONING PHASE							
Health and Safety Concerns	Number and type of safety equipment such as mask, helmet gloves and earplugs	○ Track and document any incidents related to health and safety during the decommissioning phase. This includes accidents, injuries, or any unexpected events that may pose a risk to the health and safety of workers, community members, or the environment. ○ Monitor the use of personal protective equipment by workers involved in the decommissioning process. Ensure that appropriate PPE, such as helmets, gloves, masks, and safety boots, is worn consistently to minimize the risk of occupational hazards.	Weekly	Inspection; Voluntary testing;	Zero incidence/ accident	Contractor/ MU-PIU/ Consultant	5,000,000
Air pollution	Measurement of ambient gaseous (Noxious gasses (CO, CO_2, NO,	○ Implement air quality monitoring measures to assess potential exposure to harmful substances or dust particles released during decommissioning activities. This can involve the use of air	Quarterly	Measurement of particulate matter and ambient pollutant gases	TBS / WHO Guidelines • SO2< 0.5mg/m3 • CO < 10 - 30mg/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
	NO_X, SO_X)) and particulate matter (PM_{10} & $PM_{2.5}$)	quality sensors to detect and measure pollutants in the air.			CO2 <500-600 • NOx< 0.12-0.2		
Total							**53,000,000**

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 project. 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 project 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.

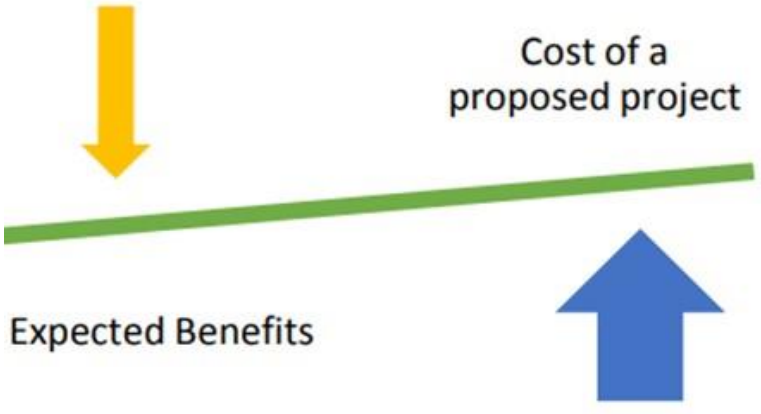

Figure 9.1: Cost and Benefit Analysis for CBA (Source: Author works through Google)

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 111,000,000. 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. 53,000,000 and TZS. 58,000,000, 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, industrialization, and economic growth.

9.3 Benefits related to the proposed project

The proposed project 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 construction projects of WSP and Composting facility may have negative impacts, they are generally higher 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 mobilization, construction, operation, and decommissioning. These benefits include environmental protection from wastewater, public benefits, revenue generation, and multiplier effects that create linkages with the local and national economy.

a) Direct Benefits

The project implementation will result in numerous employment prospects, provide educational and research opportunities for different students, it facilitates wastewater treatment, generate entrepreneurial opportunities for the local community, and contribute to the growth of agricultural activities due to the reuse of treated effluent, also WSP and Composting facility it ensures sustainability and cost-effectiveness compared to other wastewater treatment plants and solid waste facilities. Many of these intangible benefits directly benefit the stakeholders involved in the project.

b) Indirect Benefits

The proposed project brings about indirect advantages, primarily seen in the form of environmental protection, educational opportunities, Water conservation and Aesthetic Enhancement of MU environment. It's important to note that the specific benefits may vary depending on the design, operation, and maintenance of the wastewater stabilization pond at MU. Regular monitoring and adherence to best practices are crucial to ensure optimal performance and maximize the indirect benefits associated with the system.

9.3.1 Benefits to MU

The proposed project will bring long-lasting benefits to MU throughout its lifespan. WSP and Composting facility can offer benefits to MU in terms of environmental sustainability, cost savings, educational opportunities, community outreach, water conservation, and regulatory compliance. 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.

9.3.2 Benefits to the Local Community

The proposed project of WSP and Composting facility at MU benefits the local community by improving water quality, enhancing health and sanitation, preserving the environment, promoting sustainable development, create economic advantages and providing education and research opportunities. Through these benefits, the project contributes to the overall well-being and prosperity of the community, fostering a healthier and more sustainable future for all the necessary skills and experience.

9.3.3 Benefits to the Government

The project is expected to bring various benefits to the government. The project aligns with the government's commitment to sustainable development and environmental protection. By treating and managing wastewater effectively, the project helps to reduce pollution and safeguard local water bodies and ecosystems. This contributes to a healthier and more sustainable environment for communities in the region.

Furthermore, the project addresses public health concerns. Proper wastewater treatment significantly reduces the risk of waterborne diseases, protecting the health and well-being of people. Consequently, the government can allocate fewer resources to healthcare interventions related to waterborne illnesses, leading to potential cost savings and improved overall public health outcomes.

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 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.

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 wii be required to prepare a detailed Demolition Plan and Construction Management Plan to the satisfaction of the proponent and relevant authorities prior to commencement of work 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:

- To ensure that designers of the WSP and composting facility 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.
- To identify the potential decommissioning options and the final status of the WSP facility. These options will be evaluated and narrowed down to the preferred decommissioning method as the end of the project lifespan approaches.
- To demonstrate to Regulatory Agencies that important considerations regarding decommissioning are taken into account as early as possible during the initial project design.
- To showcase various aspects related to decommissioning, such as methods, costs, schedules, and the operational impact on the infrastructure facilities.
- 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:

a. Estimating the required manpower, materials, and costs to support the decommissioning activities.
b. Describing the intended final disposition and status of the plant and site after decommissioning.
c. Discussing the commitment to allocate adequate financing for the decommissioning process.
d. 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.
e.

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 WSP and Composting 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 WSP facilities, 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 some facilities 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 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. **Ponds and other infrastructure**

- All construction materials equipment will be dismantled and secured to ensure safety. The areas previously occupied by these infrastructures 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 utilization of the water 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 10.1. The estimated cost for the decommissioning plan is TZS 100,000,000, 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	o Consult with (RUWASA /TANGA UWASA) to disconnect the pipeline supply for the WSP project.	MU and Closure Committee	20,000,000

Activity	Closure Plan	Responsibility	Estimated Budget
dismantle the structures.	○ All concrete will be demolished. ○ Warning signs will be displayed, and a fence will be erected around all area of WSP and Composting facility. ○ Qualified engineers will supervise all disassembling and demolition activities. ○ The Closure Committee will oversee and monitor all closure activities to ensure proper execution. ○ Technical assistance during the closure phase will be sought by consulting relevant stakeholders.		
Personal Protective Equipment (PPE)	○ 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	10,000,000
Waste Management	○ During the closure phase, proper waste sorting will be implemented for efficient management. ○ A review process will be established to regularly update the waste management plan to adapt to changes in WSP plans, schedules, community standards, and recognized best practices. ○ Instead of being dumped on land, debris can be utilized to fill feeder roads, providing an alternative use. ○ All hazardous wastes discovered during the decommissioning of the WSP will be cleaned up and disposed of in accordance with regulations. ○ The closure committee will ensure that no waste is disposed of in water bodies.	MU and Closure Committee	20,000,000
Rehabilitation of project site	○ A suitable re-vegetation plan will be executed to restore the site to its original condition. ○ Measures will be implemented during the vegetation period to control surface water runoff and prevent erosion. ○ 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. ○ Fencing and signage will be installed to limit access and minimize disturbances in newly vegetated areas.	MU and Closure Committee	50,000,000
Total			**100,000,000**

CHAPTER 11: SUMMARY AND CONCLUSION

11.1 Summary

The study aimed to comprehensively evaluate the potential environmental and social consequences of the project. The wastewater stabilization ponds, and composting facility were envisioned as crucial components for sustainable waste management practices in the specified region. The assessment involved a thorough examination of potential impacts on water quality, air quality, soil, vegetations, and the overall socio-economic fabric of the local community. It also considered the regulatory and policy frameworks relevant to the project. The findings indicate that with proper implementation of mitigation measures and adherence to environmental guidelines, the proposed facilities can be established with minimal adverse effects on the environment and social dynamics.

11.2 Conclusion

The study concludes that the project is feasible, provided that all recommended measures are diligently incorporated into the planning and execution phases. The establishment of wastewater stabilization ponds and a composting facility is expected to contribute positively to environmental sustainability, public health, and the overall well-being of the community in the Mkinga District.

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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), Resettlement Plan Framework (RPF) and stakeholder Engagement Plan (SEP).
3. Environmental Impact Assessment (EIA) Guidelines, Annex 2,1992
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7. The Tanzania Development Vision 2025 of 2000.
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34. United Republic of Tanzania, 2021. National Environmental Policy (2021).
35. World Bank Environmental and Social Standards (ESS) for HEET as stipulated in the Environmental and Social Framework (ESF) and other guiding tools.
36. World Health Organization (WHO). Air Quality Guidelines Global Update, 2005. PM 24-hour value is the 99th percentile.

APPENDICES

Appendix 1: Certificate of Occupancy

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF LANDS, HOUSING AND HUMAN SETTLEMENTS DEVELOPMENT

Telegrams: LANDS
Telephone: 2121241-9
In reply please quote:
Ref. No. LR/T 6887

LAND REGISTRY,
P.O Box 1191,
Dar es salaam.
Date: 01 Feb, 2023

MZUMBE UNIVERSITY
P.O Box 1
MZUMBE-MOROGORO

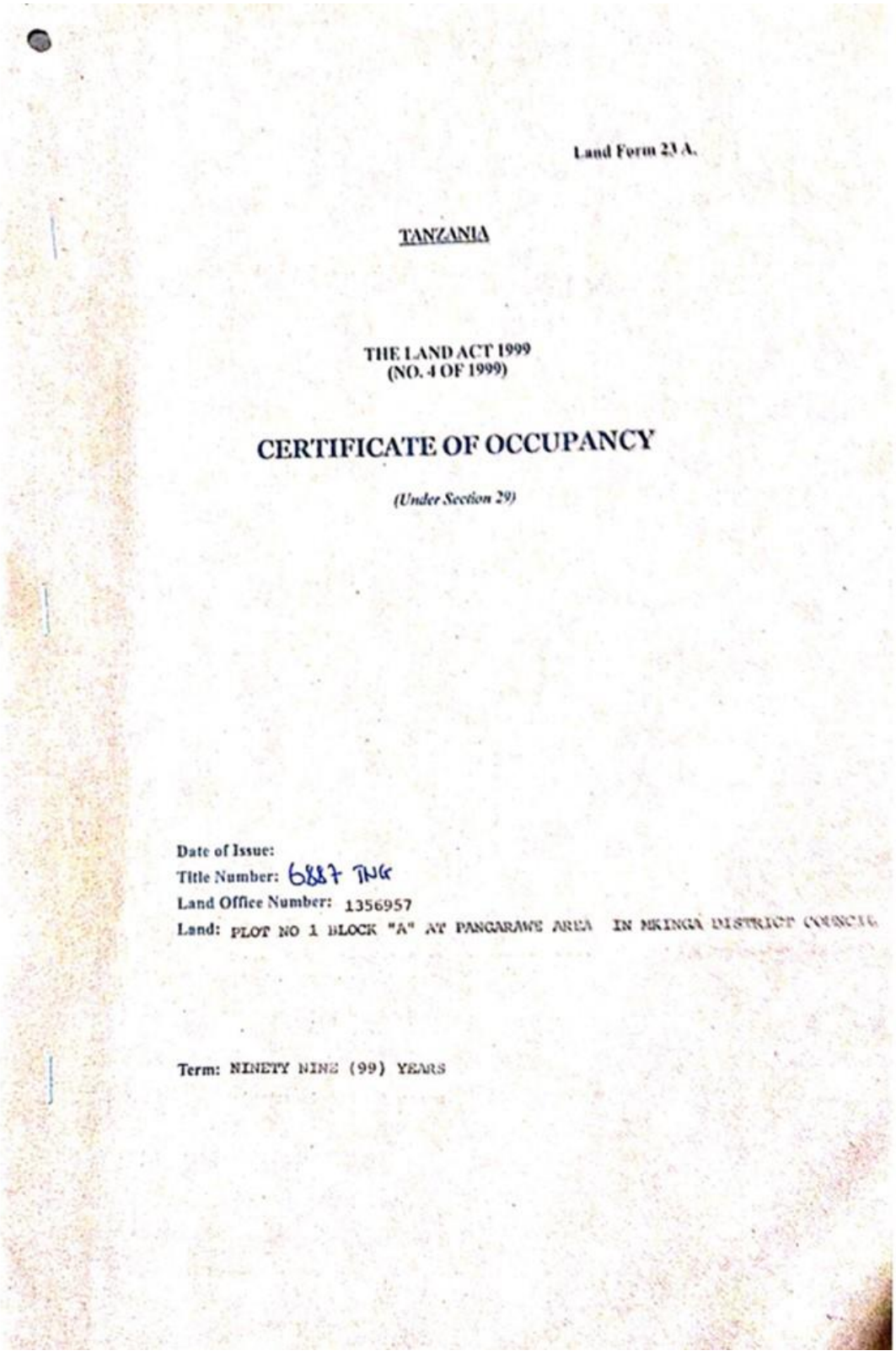
Sir/Gentlemen/Madam,

RE: TITLE NO: 6887 LAND OFFICE NO: 1356957
PLOT NO. 1 BLOCK A AT PANGARAWE

I have the honour to enclose herewith duplicate of the Certificate of Title Numbered as above please.

Ag. REGISTRAR OF TITLES

Copy to: Commisioner for Lands
Your LD File No: MKG/LD/1250 refers



Land Form 23 A.

TANZANIA

THE LAND ACT 1999
(NO. 4 OF 1999)

CERTIFICATE OF OCCUPANCY

(Under Section 29)

Date of Issue:
Title Number: 6887 TNG
Land Office Number: 1356957
Land: PLOT NO 1 BLOCK "A" AT PANGARAWE AREA IN MKINGA DISTRICT COUNCIL

Term: NINETY NINE (99) YEARS

TITLE No: 6887 TNG
REGISTERED ON: 1.2.2023
AT: 1.00 PM
Senior Asst. Registrar of Titles

TANGANYIKA STAMP DUTY ACT
Stamp Duty Shs: 730,159/= Paid
On Original Receipt Shs: 923006151479607
of: 06.01.2023
Stamp Duty Officer

Land Form No. 22

TANGANYIKA STAMP DUTY ACT
Stamp Duty Shs: 100/= Paid
Receipt No: 923006151479607
of: 06.01.2023
Stamp Duty Officer

THE UNITED REPUBLIC OF TANZANIA

THE LAND ACT, 1999

(NO. 4 OF 1999)

CERTIFICATE OF OCCUPANCY

(Under Section 29)

Title No. 6887 TNG

L.O. No. **1356957**

File No.MKG/LD/1250

he 31st day of January Two Thousand Twenty Three

HIS IS TO CERTIFY that **MZUMBE UNIVERSITY Established Under The University ct (No 7 of 2005) of P.O. Box 1, MZUMBE-MOROGORO OF MOBILE NO. +255 023 31212** (hereinafter called "the Occupier") is entitled to the Right of Occupancy (hereinafter lled "the Right") in and over the land described in the Schedule hereto (hereinafter called "the nd") for a term of **Ninety nine (99) years** from the **First** day of **January two thousand and enty three** according to the true intent and meaning of the Land Act and subject to the ovisions thereof and to any regulations made hereunder and to any enactment in substitution ere for or amendment thereof and to the following special conditions:-

1. The Occupier having paid rent up to **the thirtieth** day of **June 2023,** shall hereafter pay rent of **fourteen million six hundred one thousand nine hundred ninety six (Tshs. 14,601,996/=) Tanzanian Shillings Only** a year in advance on the first day of July in every year of the term without deduction **PROVIDED** that the rent may be revised by the Commissioner for Lands.

2. The Occupier shall:-

   i. 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 responsible for Surveys and Mapping.

(i) Do everything necessary to preserve the environment and protect the soil prevent soil erosion on the land and do all things which may be required by authorities responsible for environment and to achieve such objective.

(ii) Erect on land Buildings in permanent materials designed for use in accord with the conditions of the right and which conform to the building line (if decided by the **Mkinga District Council** (hereinafter called "**the Authority**")

(iv) Submit to the Authority building plans within Six months from the date commencement of the **Right**

(v) Begin building construction within six months after the approval of the build plans by the Authority.

(vi) Complete the building construction within Thirty Six months from the date commencement of the **Right.**

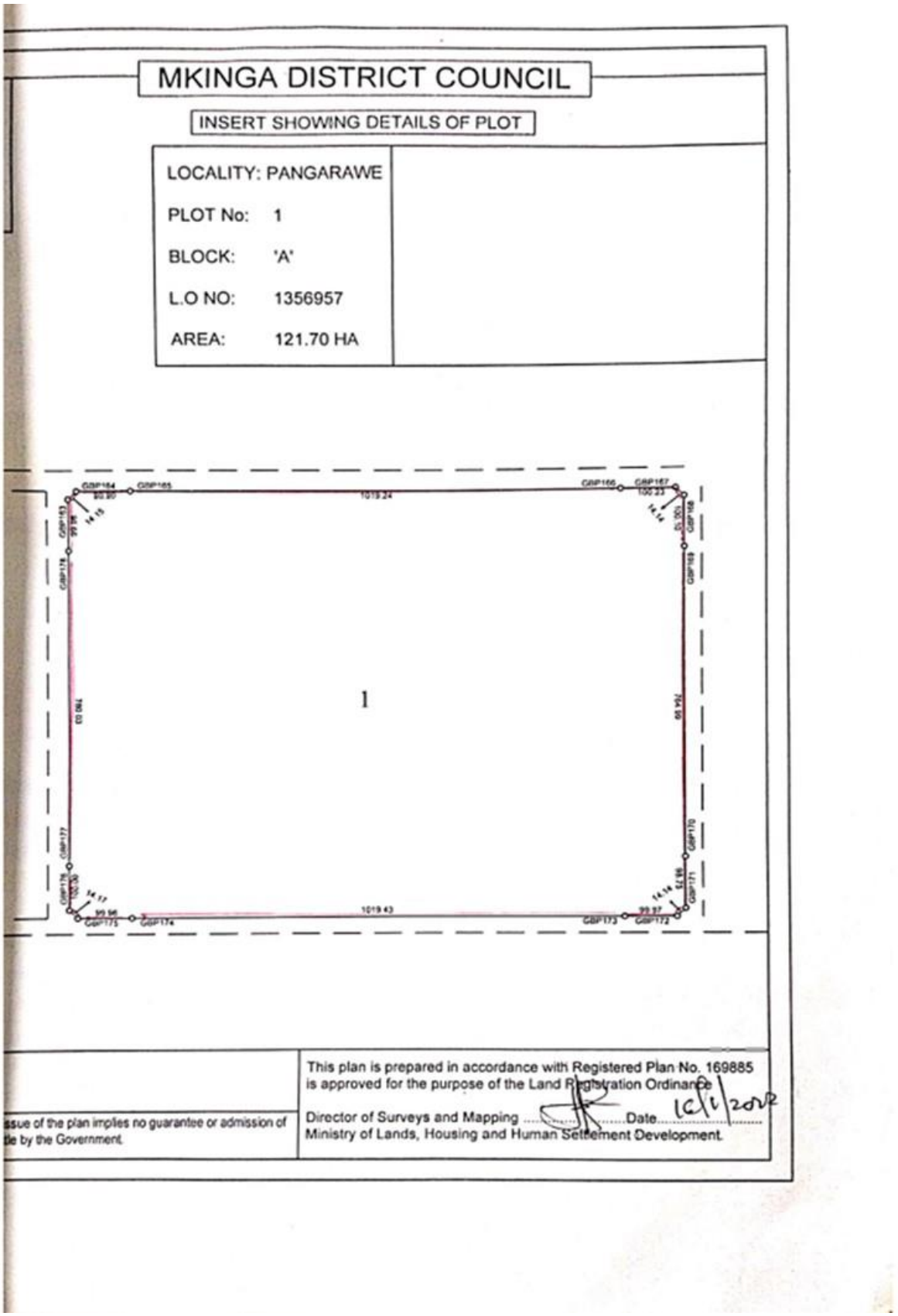
(vii) Plant, maintain, protect and preserve or conserve not less than five trees on land within thirty six months from the day of commencement of the Right. occupier may plant fruit or wood trees depending on the climatic condition such land or as it can be directed by planning authority and shall ensure such t are kept, maintained or replaced throughout the term of such Right of occupan

3. **USER:** The land and the existing buildings erected thereon shall be maintained and same shall be used for **Educational Buildings Purpose Only**. **Use Group 'K' classes (d)** as defined in Urban Planning Act (Use Groups and Use Classes) Regulati 2018.

4. The Occupier shall not assign the Right within three years of the date hereof without prior approval of the Commissioner.

5. The Occupier shall deliver to the Commissioner notification of disposition in prescr form before or at the time the disposition is carried out together with the payment o premia, taxes and dues prescribed in connection with that disposition.

6. The **President** may revoke the right for **good cause** and in **public interest**.



MKINGA DISTRICT COUNCIL

INSERT SHOWING DETAILS OF PLOT

LOCALITY: PANGARAWE	
PLOT No: 1	
BLOCK: 'A'	
L.O NO: 1356957	
AREA: 121.70 HA	

ssue of the plan implies no guarantee or admission of
de by the Government.

This plan is prepared in accordance with Registered Plan No. 169885 is approved for the purpose of the Land Registration Ordinance

Director of Surveys and Mapping ..... Date 16/1/2012
Ministry of Lands, Housing and Human Settlement Development.

SCHEDULE

ALL that Land known as **Plot No. 1 Block 'A'** situated at **PANGARAWE** in **MKINGA DISTRICT COUNCIL** containing **One Hundred Twenty One Point Seven (121.70) Hectares** shown for identification only edged **Red** on the plan attached to this Certificate and defined on the Registered Survey Plan Numbered **169885** deposited at the Office of the Director for Surveys and Mapping at Dodoma.

Given under my hand and my official seal the day and year first above written.

ASSISTANT COMMISSIONER FOR LANDS

WE, the within named **MZUMBE UNIVERSITY hereby** accept the terms and conditions contained in the foregoing Certificate of Occupancy.

SEALED with the **COMMON SEAL** of the said)
MZUMBE UNIVERSITY)
and **DELIVERED** in the presence of us)
this 25TH day of JANUARY 2023)

Name: PROF. WILLIAM J. MWEGOHA)
Signature:)
Postal Address: BOX 1 MZUMBE)
Qualification: BVC)

Name: EVELINE E. KWEKA)
Signature:)
Postal Address: 1 MZUMBE)
Qualification: AG. CORPORATE COUNSEL)

Appendix 2: Ambient Gases Measured at Project Area

S/N	Point	Coordinate	O_2	O_3	CO_2	CO	NO	SO_2	H_2S	CH4
			%	%	ppm	mg/m^3	mg/m^3	mg/m^3	%	%
1	WSP	4.99338 & 38.9503	21	0.00	0.02	0.00	0.00	0.00	0.00	0.00
2	Composting facility	4.99046 & 38.9518	21	0.00	0.01	0.00	0.00	0.00	0.00	0.00
TBS Limits			**19.5**	**0.1**	***0.6**	**10**	**0.12**	**0.5**	**-**	**-**
WHO/IFC Guidelines			**23.5**	**0.12**	**0.5**	**30**	**0.2**	**0.5**	**20**	**-**

Appendix 3: Particulate Matter Levels Measured at Project Area

S/N	Point	Coordinate	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	VOCs (mg/m^3)
1	WSP	4.99338 & 38.9503	1	1	0.000
2	Composting facility	4.99046 & 38.9518	1	1	0.000
TBS Limits			**150**	**75**	**-**
WHO/IFC Guidelines			**50**	**25**	**-**

Appendix 4: Noise levels (in dBA) recorded at Project Area

S/N	Point	Coordinate	Average Noise level in dBA
1	WSP	4.99338 & 38.9503	30.9
2	Composting facility	4.99046 & 38.9518	35.5
Environmental Management (Standards for Control of Noise and Vibration Pollution) Regulations, 2015			**60**
WHO/IFC Guidelines			**85**

Appendix 5: Vibration levels recorded at Project Area

S/N	Point	Coordinate	Vibration **(mm/s)**
1	WSP	4.99338 & 38.9503	<0.00
2	Composting facility	4.99046 & 38.9518	<0.00
Occupational Safety and Health (Working Environment) Regulations, 2016 limit of 5 mm/s PPV			**5**
WHO/IFC Guidelines			**5**