UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

UNIVERSITY OF DAR ES SALAAM

MKWAWA UNIVERSITY COLLEGE OF EDUCATION

ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT FOR THE PROPOSED DEVELOPMENT OF SCIENCE BUILDING, MULTIMEDIA AND SPECIAL NEEDS EDUCATION BUILDING, STUDENTS HOSTEL AND PHYSICS LABORATORY BUILDING AT MKWAWA UNIVERSITY COLLEGE OF EDUCATION (MUCE) ON PLOT NO 391, BLOCK "E", MTWIVILA AREA, MKWAWA WARD, IRINGA MUNICIPALITY IN IRINGA REGION

PROPONENT:
MKWAWA UNIVERSITY COLLEGE OF EDUCATION (MUCE)
P.O.BOX 2513
IRINGA, TANZANIA
TEL: +255 (026) 2702751
EMAIL: principal@muce.ac.tz

MARCH, 2024

EXECUTIVE SUMMARY

1. Introduction

Mkwawa University College of Education (MUCE) is a semi-autonomous public institution established in 2005 as a Constituent College of the University of Dar es Salaam (UDSM). The college was created to meet the demand for teachers in Tanzania following the successful implementation of education development programs. Over the years, MUCE has experienced growth in terms of staff and student enrolment. The college offers various educational programs at the undergraduate and postgraduate levels. However, the existing infrastructure inherited from Mkwawa High School is insufficient to support modern technologies and advanced research.

To address this, MUCE has received financial support about USD 5,935,531.84 from the World Bank through the Higher Education for Economic Transformation (HEET) project. The funds will be used to construct four buildings namely Science Building, Multimedia and Special Needs Education Building, Physics Laboratory Building, and Students' Hostel to enhance the teaching environment and contribute to national development.

It should be noted further that according to the World Bank Environmental and Social Framework (ESF) with Environmental and Social Standards (ESS1), and Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations 2018, before undertaking these activities project developers are required to carry out an Environmental and Social Impact Assessment (ESIA) prior to project implementation.

2. Location and Project Description

The project area found within MUCE which located on Plot No. 391, Block E, Mkwawa area, Iringa Municipal Council in Iringa region. It is connected to the road network that links the campus to the rest of the country and makes it accessible through Iringa – Dodoma Road and Dar es Salaam – Mbeya Road. Also, it can be accessed through Pawaga road as well as Mkwawa road. MUCE bordered by Ilala ward at the southern, and Mtwivila ward at the northern sides. Generally, the project area is a part of Southern Highlands of Tanzania, experiences long rainfall and short dry seasons with, more often, cool moderate winds. Also, it characterized by low-lying land that is relatively homogeneous with gentle plains intersected by seasonal streams and covered by loam, sandy loam, and alluvium soils. The soils vary between red lateritic earth grey sand to silt hardpan and iron crust "mbuga'.

The existing land use in the campus is distributed and explained in terms of zones. These are the administration zone, academic zone, staff housing zone, students' hostel zone, health centre zone, recreation zone, commercial zone, and the estate zone. The proposed establishment of four (4) buildings under HEET project will be done at the undeveloped land. Hence, the proposed establishment of Students hostel building will be constructed in the student's hostel zone, while the Science building, Multimedia and Special Needs Education building, Physics Laboratory building) will be constructed in the Academic zone. The proposed project will have capacity to accommodate 2,976 persons.

3. Nature and Scope of the project

The project deal with construction activities only, based on buildings construction including Science Building which will have capacity to accommodate 1200 people, Multimedia and Special Needs Education Building which will have the capacity to accommodate 1200 people, Students' Hostel Building which will have capacity to accommodate 276 people, and Physics Laboratory Building with capacity to accommodate 300 people. Activities for the project will be implemented in four phases namely Mobilization or preconstruction phase, construction phase, demobilization phase, operation, and maintenance phases. The project implementation is estimated to take 18 months after commencement.

Some of the materials that will be used to construct these facilities shall include steel structural frame, nominally reinforced concrete floor slabs, sand/cement hollow blocks or solid blocks depending on application, fibre cement boards for non-structural applications, pressed metal door frames, Masonite faced flush panel solid core doors, and natural anodized aluminium windows with top hung opening sections and permanent louver ventilation. Over 150 people will be employed to work at the site when construction activities begin. Once construction activities are completed, MUCE will use the hostels to accommodate students on campus.

4. Relevant Policies and Legislation

There are numbers of policies and legislations set out the legal and regulatory requirements which are relevant to the proposed project at MUCE. Additionally, there are pertinent standards governing environmental management and protection, health and safety. Relevant policies and legislations pertaining to development of the project mainly environmental management in terms of quality, health and safety, pollution of ground and surface water, pollution of soil, land and land use control among others, were examined to ensure that the proposed development project meets and abides by these regulations.

The proposed project at MUCE is subject to various policies, legislations, standards, regulations, and guidelines to ensure legal and regulatory compliance. These include policies such as

- The National Environmental Policy (2021)
- Construction Industry Policy (2003)
- National Land Policy (1997)
- National Gender Policy (2002), Energy Policy (2015)
- National Water Policy (URT, 2002)
- National Health Policy (URT, 2003)
- Education Training Policy (2014)
- National Mineral Policy (2009)
- National Employment Policy (2008)
- National HIV and AIDS Policy (2001), and among others.

Additionally, legislations and regulation were included in this report such as the

- Environmental Management Act (2004)
- Employment and Labour Relation Act (2004)
- Urban Planning Act (2007)
- Occupational Health and Safety Act (2003)
- Public Health Act (2009), Urban Planning Act (2007)

- Fire and Rescue Act (2015)
- Workers Compensation Act (No.20), (2008)
- Universities Act No. 7 of 2005, The Education (Amendment) Act, 1995
- Standard Act of 2009
- Contractors Registration Act (1997)
- Architects and Quantity Surveyors Act (1997)
- Environmental Impact Assessment and Audit (Amendment) Regulations (2018), Environmental Management (Air Quality Standards) Regulations, 2007
- Environmental Management (Soil Quality Standards) Regulations, 2007,
- Environmental Management (Water Quality Standards) Regulations, 2007
- Environmental Management (Standards for Control of Noise and Vibration Pollution) Regulations, 2015.

The ESIA study aligns with the World Bank Environmental and Social Framework (ESF), promoting sustainable and inclusive development by enhancing safeguards for people and the environment. It addresses various aspects including labour, inclusion, non-discrimination, gender, climate change, biodiversity, community health, safety, and stakeholder engagement. HEET will adhere to 6 out of the 10 relevant Environmental and Social Standards (ESSs) set by the World Bank.

- ESS1: Assessment and Management of Environmental and Social Risks and Impacts.
- ESS2: Labor and Working Conditions.
- ESS3: Resource Efficiency and Pollution Prevention and Management.
- ESS4: Community Health and Safety.
- ESS8: Cultural Heritage.
- ESS10: Stakeholder Engagement and Information Disclosure

The Environmental Impact Statement for the project will evaluate compliance with these policies, legislations, standards, regulations, and guidelines to ensure that the proposed development aligns with and abides by all relevant legal and regulatory requirements related to environmental management, health and safety, land use, and pollution control.

5. Baseline Conditions

The suggested location for proposed project it includes essential amenities like electricity, water supply, and telecommunication. In terms of wildlife, only small reptiles were noted, and there were no significant populations of large animals. Regarding vegetation, the project site features a limited variety of plant species, primarily comprising grass, shrubs, and trees (indigenous and non-indigenous trees). Shrubs and grass are the predominant vegetation types found in the proposed establishment area, and they are spread throughout it. The abundant presence of various shrubs and tree species suggests that the local ecosystem has experienced minimal disruption from human activities like tree cutting and fuel wood collection.

Also, the influx of construction workers and potentially increased student enrolment may strain existing social infrastructure at MUCE such as the MUCE health centre, electricity, water supply, religious spaces, schools, hotels, and other accommodation facilities. This pressure could lead to challenges in service provision and potential overcrowding. This might cause disruptions

in the daily lives of the existing community and students. Issues such as noise, traffic, and restricted access to certain areas may arise. In addition to that, the temporary increase in population during construction may strain resources like water and electricity, impacting the local community's daily life.

6. Stakeholders' Engagement and Public Consultation

Stakeholder identification and involvement adhered to guidelines stipulated in the Environmental Impact Assessment (EIA) and Audit Regulations (2005, along with its 2018 amendment), World Bank Environmental and Social Standards (ESS10), and the Stakeholders Engagement Plan (SEP). The public consultation process encompassed the sharing of project information, understanding stakeholder concerns, and fostering community relationships. Identification of key stakeholders was based on their roles, relevance, influence, and potential impact on the project. The Stakeholders Engagement Plan (SEP) extended its coverage to both national and sub-national levels, with a specific emphasis on sub-national stakeholders. It delineated the engagement specifics related to project activities, involving diverse stakeholders at regional, district, and village levels. The project aimed for inclusivity by engaging women, vulnerable populations, and individuals with special needs. Consultations occurred throughout the project's duration, with established mechanisms to address grievances such as Gender-based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH).

Stakeholders with diverse concerns were grouped based on the nature of their raised issues. Engagement with these stakeholders primarily took place through interviews, focus group discussions, and group meetings. The proposed project at MUCE is poised to impact various individuals and groups across different aspects of life. The affected parties encompass MUCE staff, MUCE students, residents of Mkwawa, Mtwivila, and Ilala wards, as well as the broader community of Iringa Municipality where the actual project is situated. Initial participatory discussions were held with local officials to delineate the project area and boundaries, understand resource allocation, ascertain land ownership and usage, and address general concerns. The key issues deliberated upon included the following

- Environmental Pollution (Land, water and air resources)
- Waste management both general/domestic waste and hazardous waste
- Occupational health and safety issues
- Population dynamism
- Social and economic impacts, both positive and negative

7. Environmental and Social Impact Assessment and Identification of Alternative

The different stages of the project will bring about environmental and social outcomes. These outcomes will be observed during the construction, operation, and closure periods of the project. Among these outcomes, one of the most prominent and easily recognizable ones will be the contamination of the nearby environment, which will affect the water, land, air, and project life. Although the project will be enclosed within a fence, there is still a chance of direct or indirect effects on these elements because of the project's implementation.

Some of the social and economic impact of the project

The following is a summary of the main positive impacts.

a. Job Creation and employment opportunities

b. Increased market opportunities and sources of income
c. Increase of admission of students to MUCE
d. Changes in lifestyle and quality of life
e. Increased Revenues to local authorities
f. Disruption of social activities
g. Increased Traffic and road accidents
h. Increase income to local suppliers and service providers
i. Increased skills and impart knowledge to local communities
j. Growth of Trade and Increased Investment
k. Increased commercial and social activities around project locations
l. Influx of people
m. Food Insecurity and inflation of prices on other social services
n. Increase in market for local construction materials
o. Occupational Safety and Health impacts.
p. Community Health, Safety and Security
q. Conflicts and grievances
r. Insecurity and theft
s. Child labour
t. Loss of employment
u. Loss of business opportunities
v. Disruption of flow of traffic and public mobility.
w. Production of skilled labour force for implementing various development policies, plans and goals for sustainable social and economic growth of the Nation
x. The growth of banking activities in the project area
y. Increase pressure on social services and utilities.
z. Increased level of crimes
aa. Incidence of Gender Based Violence
bb. Increase skills and impart knowledge to local communities.

Some of the environmental impact of the project

The following is a summary of the environmental impacts:

a. Loss of flora and fauna due to exploitation of borrow pits/quarries and other natural resources
b. Contamination and /impaired quality of receiving body – land and water
c. Increased Air pollution and climate change
d. Increased generation of solid and hazardous waste
e. Generations of Solid and Hazardous Wastes
f. Generations of Liquid Wastes
g. Storm water generation and overflow
h. Increased vibration
i. Air pollution due to dust and gases emission.
j. Increased Noise level
k. Loss of flora (vegetation) and fauna
l. Impact on natural resource (Energy and water)
m. Erosion of Exposed Surfaces
n. Increase storm water generation and overflow

o. Loss of Visual Aesthetics
p. Health and safety risks due to fire hazards

The proposed project site is currently continuing with core activities of providing education services and has available land space suitable for the proposed project. The option of utilizing an alternative site out of the campus will consider the existing land at the University.

8. Mitigation and Enhancement Measures

The report contains plans and a monitoring strategy to minimize or prevent any negative social and environmental consequences. The Environmental and Social Management Plan (ESMP), (**Chapter 7)** described in the report outlines the schedule for implementing the suggested strategies to address these impacts, as well as plans for ongoing monitoring. It clearly establishes the roles and responsibilities of the parties involved in mitigating and monitoring the adverse environmental and social effects. MUCE including Environmental and Social Specialist is responsible for project execution and fulfilling environmental and social management responsibilities. The authorized Environmental and Social Impact Assessment (ESIA) report will act as a reference for MUCE to implement and monitor the social and environmental impacts of the proposed project.

9. Environmental and Social Management Plan (ESMP)

This report proposes strategies to reduce or avoid the negative social and environmental effects that have been identified. These strategies, along with a monitoring plan, are outlined in the Environmental and Social Management Plan (ESMP) in Table 7.1. Most of these measures align with well-established engineering and social practices. The ESMP also defines the roles and responsibilities of various stakeholders involved in the plan. During the construction phase, the primary actors responsible for implementation are the contractor and MUCE. However, once the operation phase begins, MUCE will take on the key role in implementing the mitigation measures. The estimated environmental and social costs for these actions amount to TZS 185,000,000.

10. Environmental and Social Monitoring Plan (ESMoP)

There are four types of monitoring activities: baseline monitoring, impact monitoring, compliance monitoring, and mitigation monitoring. The Contractor's safeguard team, consisting of environmental, social, and safety experts, will conduct the monitoring of environmental and social parameters during the construction phase, supervised by the Consultant's safeguard team. Once the operation phase begins, the responsibility for mitigation and monitoring will shift to the MUCE. To assess the progress and address any emerging environmental issues, OSHA and/or NEMC will conduct annual EHS reviews, examining environmental concerns alongside the project's implementation status and sensitivity. The estimated cost for implementing the proposed environmental monitoring program is TZS 70,000,000 (Table 8.1).

11. Cost Benefit Analysis

The Environmental and Social Impact Statement (EIS) assesses the project by examining the detrimental effects it may have, taking into account the socioeconomic advantages that would be lost if the project did not proceed. The evaluation of the environmental cost-benefit ratio considers both the negative and positive impacts. Despite the project's potential financial and

social benefits, the environmental consequences can be effectively alleviated. The financial resources necessary for mitigating the adverse effects are relatively minimal in comparison to the overall investment required.

12. Decommissioning Plan

Once mobilization and construction activities are finished, all construction equipment, vehicles, and temporary facilities will be taken away from the site. The contractor will gather all equipment, tools, and surplus materials (considered as items brought to the site by the contractor or taken from the site) and store them in containers. These containers will be transported back to the contractor's yard or allocated to another project. The removal of materials and equipment will be done promptly once they are no longer required to minimize the demobilization work upon project completion.

Prior to the final inspection, the site will undergo clearance to ensure that all equipment, unused materials, and rubbish are removed, resulting in a clean and tidy appearance. All camp sites will be constructed as temporary structures, including the use of movable containers. If any of these temporary structures can be of benefit to the community, they will be offered freely to the local government for utilization in the area.

13. Summary and Conclusion

Summary

Environmental and Social Impact Assessment (ESIA) for the proposed establishment at MUCE was conducted to evaluate the potential environmental and social consequences of the proposed project. The assessment considered various aspects such as land use, air quality, noise, water resources, biodiversity, cultural heritage, and community well-being. During the ESIA process, a comprehensive analysis of the project's potential impacts was undertaken. It was found that the construction and operation of the new buildings would have both positive and negative effects on the environment and local communities. On the positive side, the project would provide additional facilities for students and faculty, enhancing the educational experience and academic programs at the university. The construction phase would generate employment opportunities and stimulate the local economy. The new buildings would also contribute to the development of infrastructure in the area.

However, the ESIA identified several potential negative impacts that need to be addressed and mitigated. These included land disturbance and habitat fragmentation during the construction phase, increased traffic congestion, noise pollution, and potential impacts on the local water resources. The assessment also considered the potential disruption to the surrounding community, including noise and dust from construction activities. To mitigate these potential negative impacts, several measures and recommendations were proposed. These included proper waste management practices, dust and noise control measures during construction, and the implementation of water conservation strategies. The assessment also emphasized the importance of engaging with local communities and stakeholders throughout the project's lifecycle, ensuring their concerns are addressed and their input is considered.

Conclusion

In conclusion, the ESIA for the proposed building project at MUCE highlighted both the positive and negative impacts. By implementing the recommended mitigation measures and actively involving local communities, the project can minimize its adverse effects on the environment and social well-being. This assessment provides valuable guidance for decision-makers, planners, and developers to ensure that the construction project proceeds in a sustainable and socially responsible manner.

ACKNOWLEDGEMENTS

The ESIA report has been prepared with the support of many people. Mkwawa University College of Education (MUCE) is grateful to all of them. MUCE would like to recognize in a special way the support rendered by the Earth Environmental Experts (3Es) Limited (Consultant) and MUCE staff as well as students. Also, appreciation is extended to World Bank (WB) Group, Ministry of Education, Science and Technology (MoEST), National Environmental Management Council (NEMC), Occupational Safety and Health Authority (OSHA), Iringa Municipal Council, Iringa Fire and Rescue Force, local community leaders and the entire community for their immensely supports and cooperation that they provided during the ESIA process. The guidance provided by these officials is much appreciated as it assisted the preparation of this report.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF PLATES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
CSO	Civil Society Organization
CSR	Community Social Responsibility
CRDB	Cooperative and Rural Development Bank
DED	District Executive Director
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EIS	Environmental Impact Statement
EMA	Environmental Management Act
ESMP	Environmental and Social Management Plan
ESMoP	Environmental and Social Monitoring Plan
ESMF	Environmental and Social Management Framework
ESF	Environmental and Social Framework
GBV	Gender Based Violence
GHOs	Grievance Handling Officer
GRIC	Grievance Redress Integrity Committee
GRM	Grievance Redress Mechanism
HEET	Higher Education for Economic Transformation
HIV	Human Immunodeficiency Virus
HSE	Health, Safety and Environment
IFC	International Finance Corporation
ILO	International Labour Organization
IRUWASA	Iringa Water Supply and Sanitation Authority
IUCN	International Union for Conservation
MEO	Mtaa Executive Officer
MoEST	Ministry of Education, Science and Technology
MUCE	Mkwawa University College of Education
NEMC	National Environment Management Council
NGOs	Non – Government Organization
OSHA	Occupational Safety and Health Authority
PAD	Project Appraisal Document
POM	Project Operational Manual
RUWASA	Rural Water Supply
SEA	Sexual Exploitation and Abuse
SH	Sexual Harassment
SEP	Stakeholders Engagement Plan
TANESCO	Tanzania Electricity Supply Company
ToR	Terms of Reference
TTCL	Tanzania Telecommunications Company Limited
URT	United Republic of Tanzania
WB	World Bank
WEO	Ward Executive Officer
WHO	World Health Organization

CHAPTER 1: INTRODUCTION

1.1 Background Information

Mkwawa University College of Education (MUCE) is a semi-autonomous public institution located in Iringa Region. The College was established on 1st September 2005 as a Constituent College of the University of Dar es Salaam (UDSM) following the transformation of the former Mkwawa High School into a University College. Its establishment was in accordance with Section 55(1) of the UDSM Act No. 12 of 1970, published on 22nd July 2005 in Government Notice No. 203. The College operates in accordance with MUCE Charter and Rules of 2009.

Initially, the College was established to offer academic and professional programmes in education. This was a response to the growing demand for teachers after successful implementation of the Primary Education Development Programme (PEDP) and Secondary Education Development Programme (SEDP). The College has grown in terms of its staffing from 123 in 2006/2007 to 304 in 2020/2021, and student enrolment from 853 in 2006/2007 to 5827 in 2020/2021. MUCE offers seven educational programmes, namely, Bachelor of Education in Arts (B.Ed. Arts); Bachelor of Education in Science (B.Ed. Science); Bachelor of Arts with Education (B.A. Education); Bachelor of Science with Education (B.Sc. Education); Postgraduate Diploma in Education (PGDE) offered by Faculty of Education; Master of Science with Education [M.Sc. (Ed.)] in Biology and Chemistry Streams offered by Faculty of Science; Master of Arts with Education [M.A. (Ed.)] in Geography Stream offered by Faculty of Humanities and Social Sciences; Master of Science in Applied Zoology; Master of Science in Applied Botany; Master of Science in Mathematical Modelling, and Master of Science in Natural Resources and Human Security Studies (M.Sc. NRHSS).

The College inherited infrastructures of the Mkwawa High School which were constructed in 1950's and cannot support modern technologies due to their small space size and nature. For example, the existing science laboratories were designed to serve a secondary school, but now have been improvised to support undergraduate students' practical. These laboratories are not only inadequate in supporting undergraduate studies appropriately, but also not fit for advancing research for postgraduate studies and community related laboratory challenges. Therefore, the College needs state-of-the-art science laboratories, equipment and facilities to support advanced research to contribute to national development.

MUCE has received financial support from the World Bank (WB) through the Ministry of Education, Science and Technology (MoEST) under the project named Higher Education for Economic Transformation (HEET). Specifically, under this project the College intends to use part of funds received to construct four buildings which are Science Building, Multimedia and Special Needs Education Building, Students' Hostel Building and Physics Laboratory Building. These buildings will be constructed within MUCE premises in Plot Number 391, Block E-Mtwivila at Iringa Municipality.

Hence, through HEET project, MUCE will improve teaching environment and equity in education and training, and enhance quality of education and training, hence contributing to the Tanzania economy through generation of quality graduates that are relevant to the labour market requirements.

It should be noted further that according to the World Bank Environmental and Social Framework (ESF) with Environmental and Social Standards (ESS1), and Environmental Management (Environmental Impact Assessment and Audit) Act No. 20 of 2004 and (Amendment) Regulations of 2018, before undertaking these activities project developers are required to carry out an Environmental and Social Impact Assessment (ESIA) prior to project implementation.

1.2 Project Rationale

Tanzania has made commendable gains in Basic education in recent year. For example, enrolment at the primary level has shown an increase of 24.5% from 8,116,488 pupils in 2015 to 10,111,671 pupils in 2018 (10,601,616 – 2019). Similarly, the enrolment trend in secondary education in the year 13/14 showed a positive increase in the number of students transitioning to post-primary education. While the country has recorded expansion in basic education, there is widespread acknowledgement among policy makers that the overall outcome of the successful performance in basic education is the demand for subsequent levels of education and especially higher education. In this regard, the main challenge is inability of the system to absorb the expanding number of graduates in basic education inspiring and capable of joining the higher education subsector. Of immediate need is the expansion of investment in infrastructure, facilities and quality assurance system in Engineering (Railway, Hydropower, Aeronautic etc.), Medical Science and Technology, Agriculture and Allied Sciences, Energy and Minerals, Forestry and Natural Resource Management. The Higher Education for Economic Transformation (HEET) project will finance the development of infrastructure, faculties, and quality assurance systems in higher education to facilitate rapid economic transformation in the country. Through HEET project, the Government of the United Republic of Tanzania seeks to build requisite operational capacities of public universities in order to empower them to be dependable drivers for economic transformation by building on their respective institutional visions, missions, objectives and core values.

1.3 Project Objectives

1.3.1. Objectives of the HEET Project

According to the HEET Project Appraisal Document (PAD) of 2021, the main objective of the project is to strengthen the learning environment and labour market alignment of priority programs at beneficiary higher education institutions and improve the management of the higher education system. The stipulated objective is in line with Mkwawa University College of Education (MUCE) Strategic Plan which focuses on expanding infrastructures to match with increase in the student's enrolment. The strategic plan of the University is to enrol 6,200 students by year 2024-2025. This calls for the need to expand its facilities including infrastructures so as to create supportive environment towards achieving its goal.

Prior to the construction of the proposed project, Environmental and Social Impact Assessment is required by World Bank and Tanzanian laws and governing in order to protect the environment and lives of people. The ESIA study shall be conducted in accordance with World Bank Environmental and Social Framework as well as Tanzania's National Environmental Management Act, Cap 191 and its subsequent Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulation of 2018.

In complying with World Bank's ESF (ESMF, POM, ESCP, SEP, LMP) and Standards as well as the provisions of the Environment Impact Assessment and Audit Regulations, (GN) No.474 of 2018, the project beneficiary (MUCE) has prepared this ESIA report which address: the nature of the project; its location; main processes; materials use, by products and their disposal; environmental impacts; and their mitigation measures. It also analyses the economical and socio-cultural impact of the project to the local community and the nation at large.

1.3.2. Specific Objectives for MUCE HEET project

In addressing the overall objective of the project, MUCE is also the beneficiary of the project had the following specific objectives:

i To construct four buildings (Science Building, Multimedia and Special Needs Education Building, Students Hostel and Physics Laboratory);
ii To upgrade learning resources and equipment including capacity building in development of online and ODL learning and pedagogy;
iii To update curriculum and introduce innovative pedagogical methodologies;
iv To promote applied research and innovation capacity;
v To building functional linkages with private sector/industry;
vi To develop online learning platforms and digital technology applications (including selecting and customizing Moodle based learning platforms);
vii To promote self-generated income; and
viii To building capacity of academic staff and university leadership.

1.4 Objectives of ESIA study

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

i. To carry out environmental screening and scooping study to identify social and environmental risks and impacts in the project site and nearby environment;
ii. To identify, analyse and assess environmental and social risks and impacts of the proposed establishment;
iii. 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.
iv. To ensure that the project comply with key relevant policy, legal and institutional frameworks and compliance of Environmental and Social Standards.
v. To recommend cost-effective measures for minimizing or eliminating adverse impacts of the proposed design, construction, operation and maintenance of the project;
vi. To prepare Environmental and Social Management Plan (ESMP), including Health and Safety Management for design, construction, operation and maintenance phases of the Project.
vii. To identify key stakeholders, the roles and responsibilities of the project implementation entity, implementing agencies and other stakeholders, legislative and regulatory requirements for the implementation of the ESMP.

viii. To inform statutory and public stakeholders about the potential impacts as well as risks and opportunities of the project and about the proposed mitigation measures.

1.5 Scope of the ESIA study

This study entailed the following;

i. To provide description of the relevant parts of the project including project location, design, components and activities.
ii. To review of policies, legislation, standards and regulations governing Environment at International, Regional and Local levels.
iii. To assemble, evaluate, and present baseline data on the relevant environmental and social characteristics of the project area.
iv. To address social mitigation including Gender Based Violence (GBV) and Grievance Redress Mechanism (GRM).
v. To make consultation with Government agencies, local communities and the private sector operating near the project area.
vi. To assess and quantify the potential environmental impacts resulting from the building development, especially within the zone of influence of the project.
vii. Describe alternatives that were examined in the course of developing the proposed project and identify other alternatives, which would achieve the same objectives.
viii. To develop an Environmental and Social Management Plan (ESMP) detailing actions and responsibilities for impacts mitigation and monitoring.

1.6 Nature and Scope of the construction work

The project will construct students' science building, physics laboratory, multimedia and special needs building and hostels. The activities for the project will be implemented in four phases namely, pre-construction, construction, demobilization, operation and maintenance phase.

Activities under planning phase include obtaining different permits and approvals for the project, conducting perimeter and topographic surveys, conducting feasibility studies, detailed engineering designs and environmental and social impact assessment studies.

Activities under construction phase shall include site establishment; mobilization of workers, transportation of equipment (bull dozers, caterpillars, heavy duty vehicles, etc.), transportation of construction materials (e.g. stone aggregates, steel, cement blocks, sand, cement, gravel, fibre cement boards, pressed metal door frames, Masonite faced flush panel solid core doors, and natural anodized aluminium windows etc.); construction of workers' camp; clearing of access roads and diversions; excavation and stockpiling of excavated materials (gravel and aggregate stone); cordoning; fencing the area within which access will be limited to construction workers and people working at the campus; construction of the camp structures; and construction hostel facilities.

Activities under demobilization phase will include laying off workforce employed during construction phase; demobilization of equipment; demolition of workers and Contractor's camp; rehabilitation/restoration of access roads; closure and restoration of materials storage yards; removal of construction wastes; re-vegetating areas that were cleared by the Contractor along the

access roads and restoration of damaged areas; and places occupied by the project construction facilities to other beneficial uses.

1.7 Methodology

The ESIA being a multidisciplinary field involved a team of experts, the key ones being EIA Expert (Team Leader), Environmental Engineer, Civil Engineer, Sociologist & GBV Specialist, Occupational Health and Safety Specialist, Municipal and Civil services engineer who worked in close collaboration with the relevant stakeholders in Iringa Municipal Council, Mkwawa, Mtwivila and Ilala wards officials carried out the ESIA study. The study included the following main tasks.

1.7.1 Document Review

Document review involved acquisition and review of project documents, and the previous ESIA report prepared for the similar projects. Other documents reviewed included different pieces of national legislation, policies, guidelines and regulations as well as international policies and guidelines and procedures. Examples of the information obtained from the different documents include project design and planned project activities.

1.7.2 Site visits

This involved undertaking systematic assessments within and around the proposed project localities. All observations were analysed 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.

1.7.3 Stakeholders' involvement

The study applied different participatory methods to involve all stakeholders. One-on-one interviews with individuals based upon a list of general topics or questions and partly based on an open discussion, were conducted. Focused group discussion was also used to gather information. Stakeholders for this proposed establishment of new facilities include government authorities, local authorities and neighbours around the area of the proposed establishment. Some of the stakeholders of relevance to ESIA study are listed below. A list of stakeholders consulted is as follows;

- MUCE Staff both Academic and Administrative
- MUCE Students
- MUCE Gender unit
- MUCE Service providers
- Mkwawa, Mtwivila and Ilala ward officials and community members
- Iringa Municipal Council.
- Tanzania Commission for Universities (TCU)
- Ministry of Education, Science and Technology (MoEST)
- Occupational Safety and Health Authority (OSHA)
- Fire and Rescue Force
- Tanzania National Electric Supply Company (TANESCO)

- Iringa Water Supply and Sanitation Authority (IRUWASA)
- Rural Water Supply and Sanitation Agency (RUWASA)
- NGOs and CBOs

1.7.4 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 were addressed on chapter 4.

1.7.5 Identification of Impacts

Potential direct environmental and social impacts are a result of interactions between project activities with the relevant baseline aspects. Principles guiding impact identification involve; Impacts identification link to causes of impacts (cause-effect interactions) and identification shall extend through entire project cycle, and all valued receptors – physical, chemical, biological, built or human on subproject site, immediate vicinity or off-site locations needs to be considered as required during the planning, designing and implementing stages of projects. The impacts were categorized as direct or indirect and whether positive or negative.

1.7.6 Impact Evaluation

Evaluation of impacts is based on the extent, duration and Magnitude. Impacts were then classified in terms of significance.

1.8 Structure of the report

The report is presented in accordance to 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:

- Executive Summary
- Table of Contents
- Acknowledgement
- List of Abbreviation

Chapter 1, Introduction: This chapter provides the general overview of the project including how the project background and justification, objectives and scope of the study and methodology used for conducting the study.

Chapter 2, Project description: This chapter details the project components and further outlines activities and materials used in all phases of the project i.e. (mobilization, construction and demobilization and operation phases).

Chapter 3, Policy, Legal and Institutional Framework: This chapter provides details of important policies, acts and regulations that govern the project.

Chapter 4, Baseline Environmental and Social condition: This chapter elaborates the project influence area and boundaries. It also describes the baseline / existing conditions of the study area.

Chapter 5, Stakeholders' Engagement Plan: This chapter explains how the stakeholders were involved during the ESIA process and presents their views regarding the project.

Chapter 6, Impacts Assessment, Mitigation Measures and Project Alternatives: This chapter discusses environmental and social impacts associated with the project analysed according to impacts significance as well as alternative projects that are more suitable to the proposed one while serving the same purpose. It also, provides mitigation and enhancement measures.

Chapter 7, Environmental and Social Management Plan: The Environmental and Social Management Plan (ESMP) presents how the identified impacts during all project phases will be managed to avoid, minimize or offset any adverse significant impacts of the proposed development.

Chapter 8, Environmental and Social Monitoring Plan: Environmental and Social Monitoring Plan elaborate how the implementation of the ESMP will be monitored throughout the phases of the project. It is a plan to monitor the efficiency of the proposed project mitigation measures.

Chapter 9, Cost Benefit Analysis: In this chapter, the Environmental cost benefit analysis is assessed in terms of the negative versus positive impacts. The potential benefits of the project, in terms of financial and social benefit are substantial.

Chapter 10, Decommissioning Plan: This chapter presents the activities involved when the proposed project is no longer operational and potential impacts to be managed.

Chapter 11, Summary and Conclusions: Summary and conclusion summarizes findings on how feasible, viable and environmentally acceptable the project is and provides recommendations to the proponent on the feasibility of the project. In addition, the report presents references and appendices that are attached herein.

CHAPTER 2: PROJECT DESCRIPTION

2.1 Location and Accessibility

2.1.1 Location

MUCE is located on Plot No. 391, Block E, Mkwawa area, Iringa Municipal Council about 3km from municipal centre (Figure 2.1). The proposed project (Figure 2.2) at MUCE bordered by Ilala ward at the southern, and Mtwivila ward at the northern sides. Thus, MUCE is connected to Ilala ward through Gate Number 1 and 2 along the Mkwawa Road and Mtwivila through Gate Number 3 respectively.

Table 2.1: GPS Coordinate of the project area

S/N	Point	Latitude (S)	Longitude (E)
1	Science Building	-7.759757	35.684523
2	Multimedia and Special Needs Education Building	-7.760584	35.691631
3	Students' Hostel Building	-7.765455	35.688536
4	Physics Laboratory Building	-7.762367	35.691769

2.1.2 Accessibility

MUCE, it is connected to the road network that links the campus to the rest of the country and makes it accessible through Iringa – Dodoma Road and Dar es Salaam – Mbeya Road. Also, MUCE is accessible from the Dar es Salaam-Mbeya Road through the Ipogolo Bus Stand that is located at a distance of 3.69 kilometres from the College. The sites for the project can be accessed through Pawaga road as well as Mkwawa road.

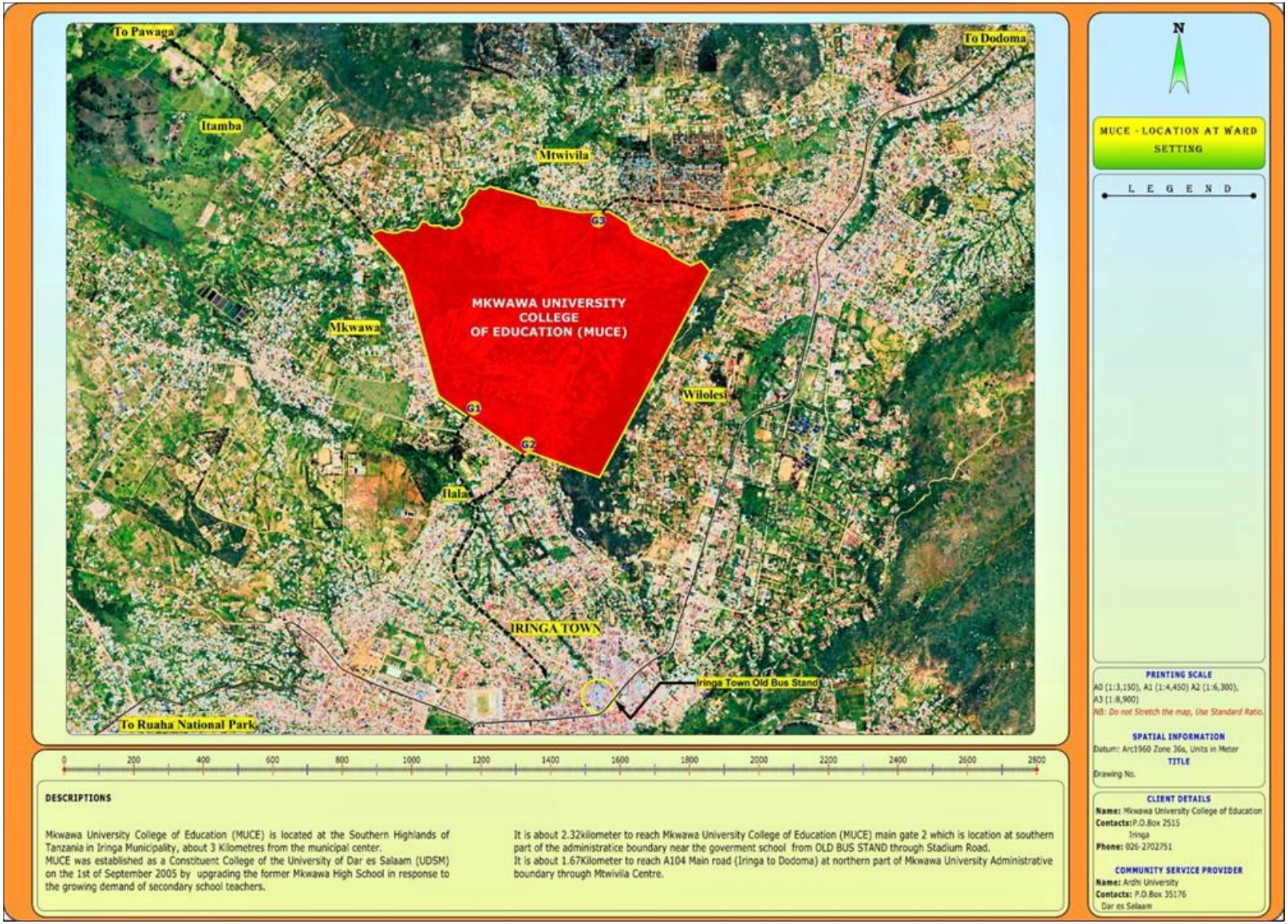


Figure 2.1: Map showing the Location of MUCE in Iringa Region (Source: MUCE Master Plan Report 2019-2039)

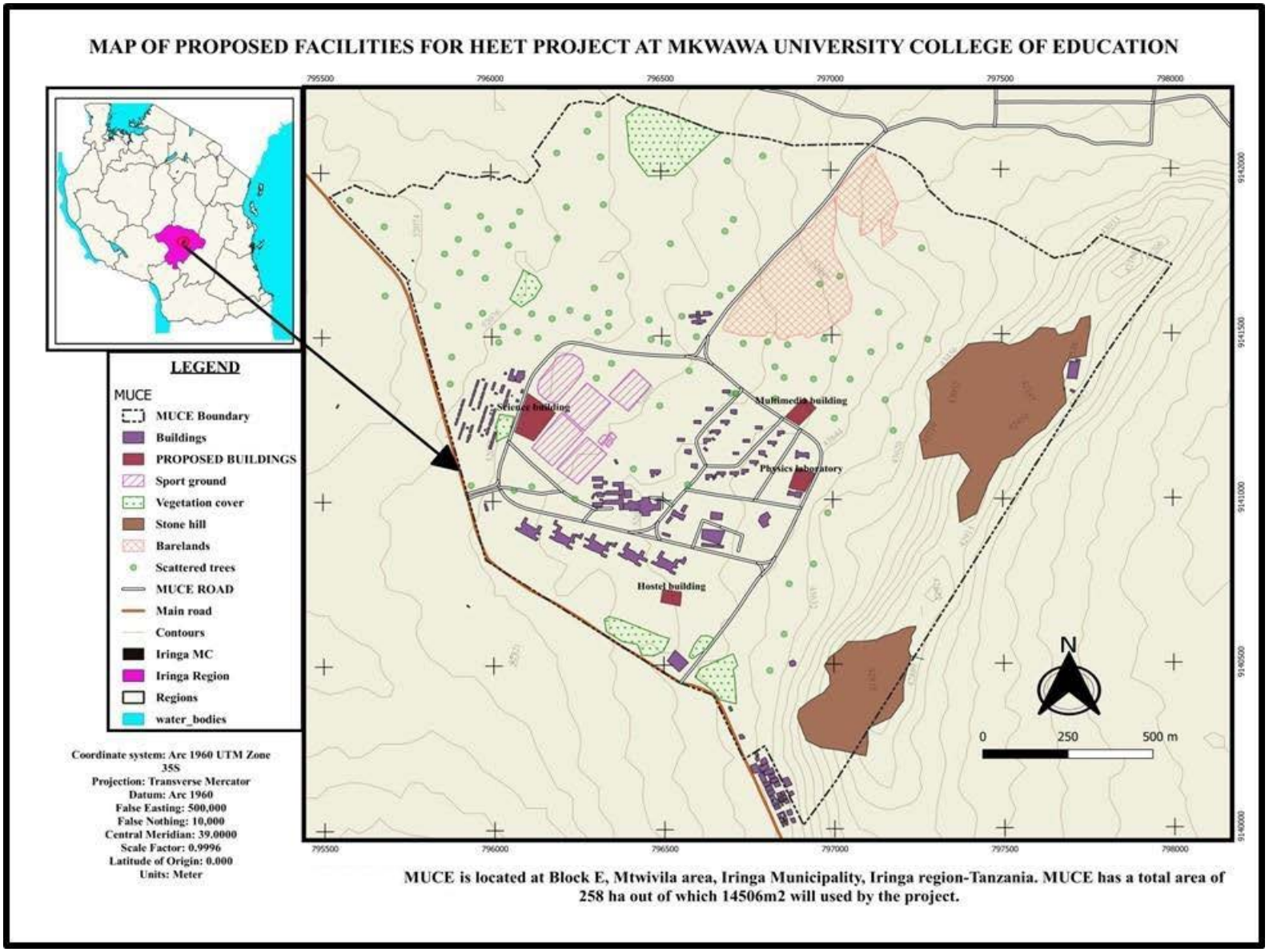


Figure 2.2: Map showing the Location of proposed buildings at MUCE (Source: 3EEE, 2023)

2.2 Project Descriptions

The project site is within the area characterized by sandy loam, sandy loam and alluvium soils, different natural and planted trees, graces and flowers cover the land surfaces. Also, there is no sensitive ecological site near the proposed site. The general area is characterized by gently sloping land and the whole site is sloping toward the south. The slope ranges from 1% to 4% respectively. The hilly land to the east of MUCE is characterized by steep slopes of about 40% that is not suitable for building developments.

The existing land use in the campus is distributed and explained in terms of zones. These are the administration zone, academic zone, staff housing zone, students' hostel zone, health centre zone, recreation zone, commercial zone, and the estate zone. The proposed establishment of four (4) buildings under HEET project will be done at the undeveloped land. Currently, there is no any activity conducted within the project area.

The Administration Zone consists of the Administration Block that includes office of the Principal, Deputy Principal Academics, Research and Consultancy and Deputy Principal Planning, Finance and Administration respectively. It also includes Office Number 5A, 5B, 5C and 5D as well as the Registry. The existing facilities at this zone have capacity to accommodate 133 persons. However, currently the total number of staff member is about 304 hence the existing facilities is not able to accommodate the whole staffing.

The Academic Zone consists of the Lecture Theatres, Lecture Rooms, Seminar Rooms, Science Laboratories, Computer Laboratories, Education Media Resource Centre, Library, and the Assembly Hall. The existing facilities at this zone have capacity to accommodate 4,572 persons. However, currently the total number of students enrolled at MUCE is about 5,827 hence the existing academic facilities is not enough to accommodate the total number of students of enrolled at MUCE.

Students' Hostel Zone consists of the undergraduate students' hostels. Staff Housing Zone consists of single storey detached and semi-detached residential houses. Welfare Zone consists of the Health Centre, Cafeteria and Staff Canteen. Health Centre is located at the northern part of the University College. The existing facilities at this zone have capacity to accommodate 4,572 persons. However, currently the total number of students enrolled at MUCE is about 5,827 hence the existing academic facilities is not enough to accommodate the total number of students of enrolled at MUCE.

The recreation zone consists of the football grounds, volleyball pitch, basketball pitch, netball pitch, golf course and the horse-riding pitch. The commercial zone consists of the CRDB Bank that is located at the southern part of the College that serves MUCE and the nearby communities of Ilala, Mkwawa and Mtwivila wards.

The proposed establishment of Students hostel building will be constructed in the student's hostel zone, while the Science building, Multimedia and Special Needs Education building, Physics Laboratory building) will be constructed in the Academic zone, while the students hostel building will be constructed in the student's hostel zone. The proposed establishments will have capacity to accommodate 2,976 persons.

2.3 Land ownership

Land for the project belongs to MUCE, which is about 258 ha out of which 14506m2 will used by the proposed project. Therefore, the proposed project at MUCE will not require any additional land out of the MUCE area hence no issues of land resettlement and compensation will arise, as the project will only use land that belongs to the MUCE (Appendix 3).

2.4 Project Scope and Activities

The proposed project deal with construction activities only, based on buildings construction including Science Building which will have capacity to accommodate 1200 people, Multimedia and Special Needs Education Building which will have capacity to accommodate 1200 people, Students' Hostel Building which will have capacity to accommodate 276 people, and Physics Laboratory Building with capacity to accommodate 300 persons. Activities for the project will be implemented in four phases namely Mobilization or preconstruction phase, construction phase, demobilization phase, and operation and maintenance phases.

2.4.1 Description of the proposed projects

Site 1: Science Building

This building will be of 4-storey with capacity to accommodate 1200 people and it is opposite to estate office (Appendix 3a). The ground floor will consist reception, lecture halls, lecture rooms, toilets (males and females), disabled toilets, urinals, ramp and circulation space (lift shaft, stair case, corridor, entrance, balcony etc). The first floor will consist high tech science room, seminar rooms, Computer laboratory, Head of Department offices with secretaries, Postgraduate seminar room, staff offices type 1, toilets (males and females), disabled toilets, urinals, pantry, server room, ramp and circulation space (lift shaft, stair case, corridor, entrance, balcony etc). The second floor will consist Science workshop, staff offices type 2, seminar rooms, toilets (males and females), disabled toilets, urinals, pantry, storage, ramp and circulation space (lift shaft, stair case, corridor, entrance, balcony etc). The third floor will consist of Computer laboratory, seminar rooms, examination office, research laboratories, toilets (males and females), disabled toilets, urinals, and circulation space (lift shaft, stair case, corridor, entrance, balcony etc). The site is located nearby the existing football ground pitch. The estimated net floor area for Science Building is 3312m^2 excluding the parking area. The project site is undeveloped one which is covered by short grasses and few trees such as Eucalyptus, Dodoma trees, and Acacia trees (Plate 2.1).

Plate 2.1: Proposed site for science building (Source: 3EEE site visit in April 2023)

Site 2: Multimedia and Special Needs Education Building

This building will be of 4-storey with the capacity to accommodate 1200 people and located adjacent to staff houses (Appendix 3b). The ground floor will consist reception, offices, lounge/common room, staff offices type 1, pantry, lecture room, toilets (males and females), disabled toilets, storage room, resource rooms for students with special needs, audiology room, broadcasting room for multimedia, teaching and learning, urinals, ramp and circulation space (lift shaft, stair case, corridor, entrance, balcony etc). The first floor will consist seminar rooms, Language Laboratory, Guidance and counselling unit, Storage/ICT, toilets (males and females), disabled toilets, urinals, ramp, and circulation space (lift shaft, stair case, corridor, entrance, balcony etc). The second floor will consist Media fabrication workshops, Head of Department offices with secretaries, Staff offices, Soil Laboratory, Physiotherapy room, toilets (males and females), disabled toilets, urinals, pantry, server room, ramp and circulation space (lift shaft, stair case, corridor, entrance, balcony etc). The third floor will consist Lecture room, Computer Laboratory, GIS Laboratory, Seminar room, Archaeology room, Examination office, toilets (males and females), disabled toilets, urinals, pantry, and circulation space (lift shaft, stair case, corridor, entrance, balcony etc). The estimated net floor area for the Multimedia and Special Needs Education building is 3454m^2 excluding the parking area. The site is undeveloped one which is covered by short grasses and few trees such as Eucalyptus, Terminalia Mantaly trees, Mango trees and Acacia trees (Plate 2.2).

Plate 2.2; Proposed site for Multimedia and Special Needs Education building (Source: 3EEE site visit in April 2023)

Site 3: Students hostel building

This building will be of 4-storey with the capacity to accommodate 276 people (Appendix 3c). This project site is located nearby the existing students' hostel called Hall 5. The ground floor will consist of Hostel custodian's office/Reception/Waiting area, shop, common room, storage, accommodation rooms, toilets ((Male and Female), bathrooms, laundry, disabled toilets, urinals, ramp, and Circulation space (lift shaft, stair case, corridor, entrance, balcony etc). The components from ground floor will be the same to first, second and third floor. The estimated net floor area for hostel building is 3463m^2 excluding the parking area. This site is located near the existing Hall 5. The site is undeveloped one which is covered by vegetation including short grasses and few indigenous trees such as *Senna siamea* (Siamese Cassia) and acacia trees (Plate 2.3).

Plate 2.3: Proposed site for Student's hostel building (Source: 3EEE site visit in April 2023)

Site 4: Physics Laboratory Building

The building will be of 3-storey with capacity to accommodate 300 people and it located nearby the existing chemistry and biology laboratories (Appendix 3d). The ground floor will consist Entrance lounge (Gowning, Technician office, Discussion room). main laboratory, Sound proof preparation room with fume chambers, workshops, storage, toilets, disabled toilets, urinals, ramp, and Circulation space (lift shaft, stair case, corridor, entrance, balcony etc.). The first floor will consist Research laboratories, main laboratory, sound proof preparation room with fume chambers, dark room, storage, toilets, disabled toilets, urinals, ramp, and circulation space (lift shaft, stair case, corridor, entrance, balcony etc.). The second floor will consist meeting room, offices type 1, offices type 2, offices type 3, offices type 4, common room, pantry, toilets, disabled toilets, urinals, ramp, and circulation space (lift shaft, stair case, corridor, entrance, balcony etc.). The third floor will consist of roof top with weather only. The estimated net floor area for physics lab is 2277m^2 excluding parking area. The project site is undeveloped one which is covered by short grasses and few vegetation such as Eucalyptus trees, *Viscum album (European mistletoe)*, *Agave Americana (American Aloe)*, *Ficus religiosa (Bodhi tree)* and acacia trees (Plate 2.4).

Plate 2.4: Proposed site for Physics laboratory building (Source: 3EEE site visit in April 2023)

2.5 Project design considerations

The overall design of the buildings will promote use of construction materials which are environmentally friendly, durable, and vandal-proof and those which require minimal periodic maintenance. The buildings are inclusive since consideration is made to persons with special needs such as physical, visual impairment, emotional and behavioural. The general design considerations will incorporate aspects of modern architecture, the current local government building policy guidelines and the latest standards developed by Contractors' Registration Board (CRB) and the Tanzania Commission for Universities (TCU) Architectural Metric Handbook which will include:

i. **Ventilation:** The design will cater for natural ventilation with features that encourage natural air circulation (including use of permanent air vents above all doors and windows).

ii. **Lighting**: The design caters for various types of energy efficient luminaries including fluorescent lamps and natural lighting through glass windows and doors as appropriate for both security and lighting.
iii. **Sanitary appliance:** The number of toilets and wash hand basins will be selected according to the number of students and workers who will be using these facilities.
iv. **Wastewater management:** Waste water from proposed project will be connected to the existing Municipal sewer system.
v. **Solid waste management:** Contractor will be responsible for the management of generated solid waste. However, during operation phase MUCE will manage their solid waste properly.
vi. **Occupational health and safety issues:** Contractor should comply with local building codes and regulations to ensure the structural integrity of the building, conduct thorough risk assessments to identify potential hazards and vulnerabilities, incorporate earthquake-resistant designs and materials to withstand seismic activity in susceptible regions, implement fire-resistant materials and systems to enhance building safety. Additionally, evacuation plans and emergency exits must be well-planned to facilitate safe and swift evacuation during emergencies.
vii. **Durable and Vandal-Proof Materials:** Contractor should consider using materials like concrete, brick, or metal cladding for durability and resistance to vandalism in external parts. And in Flooring should opt for materials like terrazzo, polished concrete, or durable commercial-grade carpeting. Also, in windows and doors contractor should use impact-resistant glass and robust door hardware and wall finishes: Consider using graffiti-resistant coatings or easily cleanable surfaces, Furniture and fixtures: Choose sturdy and tamper-resistant furniture and fixtures for common areas.
viii. **Disaster issues:** Contractor should develop buildings with disaster-resilient features, such as earthquake-resistant foundations and reinforced structures to withstand potential natural disasters. Also, establish emergency evacuation plans, implement clear and accessible evacuation plans, ensuring all occupants can safely exit the building in case of emergencies.
ix. **Climate Change Adaptation:** The building design should prioritize energy efficiency and sustainable materials to minimize its carbon footprint. Adequate insulation and natural ventilation systems can help regulate indoor temperatures, reducing reliance on energy-intensive cooling or heating. Apart from these also it is imperative to introduce the following around the new buildings:

- **Planting trees/shrubs species that are drought tolerance**

This will enhance the students and other pedestrians to walk or sit under trees without sun burn as they will provide shed. Also, along the walkway trees will be planted to enable pedestrians to walk through without the sun burn.

All these are climate changes adaptation strategy that will be adapted on the operations of these buildings.

- **Rainwater harvesting systems**

This will be enhanced by putting proper infrastructure such as gutters to tape the rain water and stored in reserves (PVC or concrete tanks) this will be implemented to mitigate water scarcity during dry periods.

- **Solar panels**

Solar panels need to be installed on the buildings to as a source of energy in case of power rationing to minimise carbon emission from the fossil fuel generators.

- **Sustainable resource use**

The design of the buildings will incorporate landscaped gardens which will be planted with suitable species of trees/shrubs and grass to prevent ecological deterioration and improve aesthetic value of the site. Part of the excavated soil will be used for landscaping therefore reducing the amount of soil to be transported away from the site.

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

2.6 Project Activities

Activities for the project shall be implemented in five phases namely planning, construction, demobilization, operation and maintenance phase, and decommission phase. Details of each of the phases are provided in the sections that follow.

2.6.1 Mobilization Phase

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

a. Topographical Survey

A topographical survey is a detailed mapping of the natural and man-made features of a piece of land and it provide accurate elevation data, typically represented by contour lines, which show the shape and slope of the land. This information is crucial for construction projects to ensure proper drainage, grading, overall site suitability and environmental consideration.

The topographical survey for proposed projects was conducted by Surveyors to establish the boundaries and the ground levels. This guarantees adherence to property limits and assists in recognizing and mitigating potential environmental and social effects outlined in the ESIA report.

b. Geotechnical investigations

The geotechnical investigation for the proposed buildings (science building, multimedia building, hostel building, and physics laboratory) at MUCE was conducted by excavation trial pits and insitu testing using Dynamic Probing Light (DPL) for each building (Appendix 4). This investigation plays a pivotal role in assessing the subsurface conditions of the site, ensuring the structural integrity, stability, and safety of the planned constructions. By examining soil and rock properties, groundwater conditions, and potential geohazards, the geotechnical investigation provides valuable insights for designing foundations that can withstand the specific geological challenges of the location.

The data obtained aids in optimizing construction techniques, mitigating risks, and ensuring the longevity and resilience of the proposed structures. In essence, a thorough geotechnical

investigation is an indispensable step in the pre-construction phase, contributing significantly to the overall success and sustainability of the proposed facilities.

c. Architectural and Structural Designs

Architectural and structural designs determine the functionality and efficiency of the facilities, ensuring that each structure meets its specific purpose. Well-thought-out architectural plans contribute to a conducive and purpose-driven environment for scientific research, multimedia activities, accommodation, and physics experiments.

Also, the structural designs play a pivotal role in ensuring the safety and longevity of the buildings. Proper engineering and structural considerations are essential to withstand environmental factors, natural disasters, and the test of time. This is particularly important for a physics laboratory where sensitive experiments require a stable and secure infrastructure.

d. Acquisition of various permits/certificates

The acquisition of various permits and certificates for proposed project based on ESIA study at MUCE and it involves acquisition of Environmental and Social Impact Assessment (ESIA) certificate, building permit, a land use permit, a water resource use permit, a waste management permit, occupational health and safety certificates.

2.6.2 Construction Phase

The proponent will contract private construction company to construct the project site. The contactor will be responsible for sourcing of materials, labour recruitment and actual construction work.

2.6.2.1 Consideration for constructing different structures

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

a) Founding conditions

The proposed building facilities will require foundation on a good and uniform soil to avoid deferential settlement. A full geotechnical investigation was conducted (Appendix 6) to ascertain the exact founding conditions of the building's structures.

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 are expected to take place for 18 months starting from January 2024 to July 2025. Over 150 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 service infrastructure like a car parking, 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,

transportation of building materials, and construction of different infrastructures and other related buildings. Other infrastructure such as drainages and utility reticulation shall also be constructed.

2.6.2.2 Construction Activities

Activities during construction phase will be including site preparation, construction of workers camp, construction of buildings, construction equipment and construction materials.

a. Site preparation

Activities under site preparation will include land clearing, grading and excavation, construction of auxiliary structures such as access roads etc., levelling and earth marking.

b. Construction of workers' camp

The project contractor will build a workers' camp at the project site which will be used to provide residence for 50 workers as well as act as project storage facilities for different building materials and equipment, workshop for servicing the vehicles and construction machinery. Several factors will be considered when selecting the camping site. The factors shall include topography of the site, proximity to the project site, availability of water and other considerations. Although the worker camps do not provide accommodation for all workers working within the proposed project, most workers (unskilled and semiskilled) will be sourced from Mkwawa, Mtwivila and Ilala wards which are closed to the proposed project.

c. Construction of buildings

Some of the activities to be undertaken will include excavation of foundation footing, laying down a brick base, pouring a concrete slab, installation of framework, installation of plumbing workers, putting a wall frame, roofing, and finishing.

d. 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.
- Light machinery like pedestrian rollers for access road compaction.
- Front end loader for loading materials onto tippers and lorries.
- Several light equipment-like 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, trucks, wheel loader, forklift, excavator etc.

e. Construction materials

Different raw materials will be required during the construction phase. Materials such as sand, gravel and quarry stone will be outsourced from different places. The building materials such as

quarry stone, gravel and sand will be collected from approved sites. Use of concrete blocks for construction of different infrastructures will be more environmentally friendly than use of burnt bricks, which contribute to deforestation.

Other materials such as cement, concrete block, paints, timber, roofing materials, windows, doors and other joinery, tilt and roller doors, wallboard and plasterboard, light fittings, fuel and oil, electricity, water, ceramic tiles, steel, pipes, adhesives, copper wires, gas (acetylene and oxygen), cardboard will also be outsourced for the project.
Whoever contractor that will be awarded the construction bid will adhere to Health, Safety and Environmental (HSE) standards as per construction regulations. MUCE will have the Key personnel who will be responsible for checking the HSE Standard operation procedures (SOP) to comply with the legal requirement.

- **Sourcing of materials**

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

- **Transportation of materials**

The contractor will be responsible for the transportation of all construction materials and equipment from point of sourcing to the site mainly through Pawaga road as well as Mkwawa road.

2.6.3 Demobilization Phase

The main activities to be undertaken during demobilization phase shall include demolition of the storage facility. Rubble from construction activities, demolished storage facility, and other waste from construction activities will be used as fillers during foundations. 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. The 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.

Also, care shall be taken to make sure other few existing areas like auxiliary facilities such as quarries/ borrow pits can be used to avoid environmental degradation to pristine areas through proper restoration and rehabilitation.

2.6.4 Operation and Maintenance Phase

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

- Daily teaching and training to workers.
- The employment of the cafeteria for providing food services.

- Management, maintenance and operation of existing infrastructures like wastewater systems etc.
- Maintenance of water supply facilities.

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

2.6.5 Decommissioning Phase

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

2.7 Manpower and Utility Requirements

2.7.1 Manpower Requirements

The proposed project will temporarily employ about 150 people during construction phase. Employment during construction phase will be under the Contractor and will be in the form of skilled as well as unskilled labourers considering both genders. 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.

2.7.2 Energy Supply

The Access Roads host power lines, while others traverse the campus, supplying electricity to various buildings. The campus currently draws power from three distinct sources. The primary source is the power station situated in the academic zone near Lecture Theatre WB, along the road from Gate Number 2. Additionally, power is derived from a step-down transformer located along Mkwawa Road near the students' hostel (hall 6), serving the campus from the western side. Furthermore, the power supply lines along Mkwawa Road are linked to the campus through Gate Number 2, delivering power from the southern side. These three power sources collectively fulfil the existing demand on campus. Hence, the proposed project will be supplied by TANESCO from the national grid network and on top of that backup generator will be used during emergency.

2.7.3 Water Supply

The campus has two water sources: the IRUWASA Water Supply Network and the MUCE Boreholes. IRUWASA, the primary water source, delivers water to the campus via a main along Mkwawa Road, connected at Gate Number 2. This water travels to a ground water tank at the campus's highest southeast point and then gravity-feeds throughout the entire campus.

The MUCE Boreholes offer an alternative water source. Presently, the University College has three boreholes, but two are non-functional due to various issues, including a lack of power. The third borehole exclusively supplies water to the MUCE Health Centre and is not linked to the campus's existing water distribution network.

Therefore, water from IRUWASA and MUCE boreholes will be used for construction activities and for domestic purpose (flushing of toilets) and cleaning activities during construction and operation phases. It is expected that about 40000 litres per day of water will be used during construction phase.

2.8 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.

2.8.1 Products

The final product will be a 2976 student's capacity.

2.8.2 By-Products

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

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

2.9 Waste Management

2.9.1 Solid Waste

2.9.1.1 Construction phase

Major wastes generation associated with the project construction and their treatment/ disposal methods are described in Table 2.2.

Table 2.2: Waste generation and treatment during construction Phase

Activity	Waste type	Amount	Treatment/ Disposal Method(s)
Clearing of topsoil	Spoil Soil	Significant	This soil shall be stockpiled along the foundation trenches for all structures and backfilled for pipes laying. The soils shall be used to reinstatement site at the end of the project, the spoiled materials shall be disposed to designated disposal sites
Biodegradable solid waste (Hazardous and non-hazardous	Vegetation (Branches and tree limbs)	Not Significant	Chipped or ground into smaller pieces this will reduce reduces the volume of waste and creates mulch that can be reused on-site for landscaping or erosion

Activity	Waste type	Amount	Treatment/ Disposal Method(s)
waste)			control
	Food remains	Not Significant	Collected by Iringa Municipal Council and disposed at the Municipal dumpsite. These solid wastes are organic in nature and thus proper management is required in time to avoid bad odor if they are not collected in time
	Hazardous waste (electrical equipment, concrete additives, tins, scrap metal etc	Not Significant	Collected within the designated dustbin then taken to the storage area and finally disposed by an authorized contractor/Iringa Municipal council
Actual Construction waste (non-biodegradable)	Rubbles	Not Significant	Will be stockpiled and used to fill cut sections
	Scrap metals	Not Significant	Sell to recyclers
	Timber	Not Significant	Provided to locals for re-use
	Cement bags	Not Significant	Sell to recyclers

2.9.1.2 Operation phase

The main solid wastes that will be generated at the site are biodegradable and non-biodegradable solid waste. Biodegradable solid waste will include vegetation, food remains, cardboards and papers, which will be collected in waste collection points ready for disposal at the Municipal dumpsite. Non-biodegradable solid waste will include waste like scrap metals, glasses, and plastics which will be collected in the waste collection points and sold to registered contractors. E-wastes like computers, printers, and tonners will be disposed based on the Environmental Management (Control and Management of Electrical and Electronic Equipment Waste) Regulations of 2021. The total amount of solid waste generated is expected to be 3.5 tons/day based on generation rates of 0.35kg/day/person and population projection about 10,000 persons.

2.9.2 Liquid waste

Liquid waste will be generated at the site from washrooms and will be collected, managed and discharged direct into public sewer. Storm water will be managed properly to improve drainage within the development. Other liquid waste generated it includes oil and greases.

According to Tanzania Water and Wastewater Design Manual, 2009 (4th Edition, 2020), between 60 to 85 percent of the per capital consumption of water becomes waste water. For the purpose of this design, it is considered that 80% of water consumed will be discharged as waste water

2.9.2.1 Construction phase

Assuming that;

- There will be 150 people (Worst case scenario)
- Water consumption = 40L/Capital/Day
- 80% of water consumed becomes wastewater.
- 100% of the workers shall use University toilets.

- Wastewater generation per day = 150 x 40 x 0.8

Therefore, about 4.8m^3 of liquid waste will be produced per day from the site during construction period. The wastewater will be collected and treated through public sewer.

2.9.2.2 Operation phase

Assuming that;

- There will be 10,000 people (Population projection) (Worst case scenario)
- Water consumption = 40L/Capital/Day
- 80% of water consumed becomes wastewater.
- 100% of the students and workers shall use University toilets.
- Wastewater generation per day = 10,000 x 40 x 0.8

Therefore, about 320m^3 per day of liquid waste will be produced from the site during the operation period. The wastewater will be collected, managed, and treated direct through public sewer.

2.9.3 Storms water management

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

2.9.4 Cleaning

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

2.9.5 General repairs and maintenance

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

2.10 Occupational health and safety (OHS)

2.10.1 OHS During construction phase

MUCE 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 DARUSO leadership will provide relevant trainings to students to ensure smooth navigation of their daily to day transportation. The speed limit will be set not exceeding 50km/h but within the designated area shall not exceed 10km/h. The contractors shall ensure all their drivers are aware of the set speed limits to ensure safety within the project area and, both the entrance and exit areas will be identified and labelled.
Also, it explains the mitigation measures for hazards and risks associated with health and safety which include the following;

2.10.1.1 Slips and falls

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

2.10.1.2 Working at height

- Erect and dismantle scaffolds according to manufacturer guidelines and industry standards.
- Regularly inspect scaffolding for stability and structural integrity.
- Install safety nets where feasible to catch falling workers or objects.
- Regularly inspect equipment, scaffolding, and other structures for damage, wear, or defects.
- Select the right ladder for the job and ensure it's in good condition.
- Place ladders on stable, level surfaces and secure them to prevent slipping.

- Provide workers with appropriate personal protective equipment (PPE) such as helmets, gloves, and footwear designed for working at heights.
- Train workers on the proper use of fall protection equipment, safe work practices, and emergency procedures.
- Assign a competent supervisor to oversee work at heights and ensure safety procedures are followed.
- Establish effective communication methods between workers at different heights and ground level.

2.10.1.3 Moving machinery

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

2.10.1.4 Diseases prevention

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

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

2.10.1.5 Being struck by objects

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

2.10.1.6 Over-exertion

- Conduct ergonomic assessments of workstations and tasks to identify potential over-exertion risks.
- Modify workstations and equipment to minimize physical strain and discomfort
- Contractor should train employees on proper lifting techniques, including bending at the knees, keeping the load close to the body, and using leg muscles instead of back muscles.
- Reduce the weight of materials, tools, or equipment when possible.
- Provide mechanical aids such as lifting devices, conveyor belts, or adjustable height workstations to reduce manual lifting and carrying.
- Design workstations and workflows to minimize the need for repetitive or forceful movements.
- Contractor should make a job rotation or task alternation to reduce the repetitive nature of physically demanding tasks and provide rest periods.

- Employees should ensure to maintain good posture while working, which includes sitting or standing with a straight back and avoiding excessive twisting or bending.

2.10.1.7 Ergonomics injuries and illness

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

2.10.2 OHS During operation phase

All the safety issues will be taken into consideration including the allocation of emergency assemble point; Emergency plans and procedure will be developed to prevent and mitigate the likely consequences of accidents associated with the project (construction). There will be a document that outlined in detail the potential accidents/emergencies and how to respond. This document will also explain on how to mitigate environmental hazards. The document will also respond to Occupational Health and Safety hazards related to daily operation such as 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.

2.11 Environmental, Health and Safety (EHS) Management Strategy to be adopted by the Contractor

The EHS is a broader and holistic aspect of protecting the worker, the workplace, the tools/ equipment, and the biotic environment. It is an essential tool in determining the EIA study. The objective of the EHS on the proposed project is to develop rules that will regulate environmentally instigated diseases and occupational safety measures during construction and the operation phases of the proposed project by:

- Avoidance of injuries
- Provision of safe and healthy working environment for workers' comfort to enhance maximum output.
- Control of losses and damages to plants, machines, equipment, and other products.
- Enhance environmental sustainability through developing sound conservation measures.

2.11.1 Organization and implementation of EHS Management Plan

The contactor shall use the EHS plan at the proposed project site both during construction and operation. The engineer will use it during construction phase with the assistance of an EHS consultant who shall enforce its provision throughout the life of the project. There is guiding principles to be adopted by the contractor, hence the company/contractor will be guided by the following principles: -.

- It will be a conscious organization committed to the promotion and maintenance of high standards of health and safety for its employees, the neighbouring population and the public at large.
- Ensuring that EHS activities are implemented to protect the environment and prevent pollution.
- Management shall demonstrate commitment and exercise constant vigilance to provide employees, neighbours of the project and the environment, with the greatest safeguards relating to EHS.
- Employees will be expected to take personal responsibility for their safety, safety of colleagues and of the public as it relates to the EHS management plan.

2.11.2 EHS management strategy to be adopted by the contractor

The following strategies will be adopted to achieve the above objectives:

- Create an Environment Health and Safety Management committee and incorporate EHS as an effective structure at various levels and units to manage and oversee EHS programs in all construction and operation phases of the project.
- Maintain an effective reporting procedure for all accidents.
- Provide appropriate tools and protective devices for the success of the project.
- Encourage, motivate, reward and support employees to take personal initiatives and commitment on EHS.

2.11.3 Safety Agenda for both the proponent and contractor

There will be a permanent EHS agenda during construction.

i. Contractors

The contractor should train residents and workers on the importance and use of health and safety equipment. EHS management plan code of practice shall be applicable to the contractors working in the premises and shall be read and signed. It shall be incorporated into the contract to perform work. This should also remind the contractor of his/her.

- Legal requirements.
- Statutory obligations
- Obligation to lay-down a system for reporting accidents.
- Responsibility to ensure that his/her employees are supplied with personal protective equipment and where applicable as per the EHS management plan for the whole project.
- Responsibilities as it relates to contracting an EHS consultant in liaison with the proponent.
- Obligation to ensure that he obtains detail of jobs and areas where permit-to-work must be issued.

ii. All residents and workers' responsibility

Know the location of all safety equipment and learn to use them efficiently.

2.11.4 Safety requirement at the project site during construction period

i. The Contractor

The contractor will ensure that:

- Safe means of entry and exit at the proposed project site.
- Ensure adequate briefing of job at hand on the safe system of work before commencement of work.
- The EHS coordinator must attend all times throughout the duration of the project.
- The EHS consultant must maintain constant assessment of the risk involved as the work progresses.
- A safety harness must be worn before entry into all confined spaces.
- An EHS consultant must be posted at the entrance of the project site to monitor progress and safety of the persons working at the construction site.

ii. The Drivers

Within the construction premises, the following traffic rules will be observed: -

- Observe speed limits and all other signs and obey traffic rules.
- Use the vehicle for the purpose to which it is intended only.

iii. Fire hazards at the construction site

Workers at the site shall ensure that: -

- Oxy-acetylene cylinders are not contaminated with grease or oil.
- Oxy-acetylene cylinders are not subjected to direct sunlight or heat.
- Oxy-acetylene cylinders are not to be used or stored standing in a vertical position.
- When in use, ensure the inclination should never be over 30° from the vertical.

2.11.5 Welding at the construction site

It is the responsibility of the contractor during construction to:

- Ensure that welding clamp is fixed such that no current passes through any moving parts of any machine.
- Ensure that all welding clamps are in good operating condition and conduct current without arcing at the point of contact.
- Ensure that welding clamps are free from any contact with explosive vapours for example. Oil spillage, Fuel tanks, Coal dusts and miscellaneous combustible material (for example, Cotton rags filter bags, rubber belting, and wood shavings)
- Ensure that any slag or molten metal arising from welding activities does not start up. Fires by:
- Clearing combustible material to a distance of at least 3 meters away from the working area
- Appropriate fire extinguisher is to be always kept available for immediate use.

2.11.6 Fire Protection and Management

In case of fire, fire response system will be invoked to respond immediately. The plan will include adequate number and size of fire-fighting equipment placed at strategic positions. The

proposed project will incorporate provision of smoke detectors and fire hydrant system. There will be fire drills conducted periodically to equip students and staff on how to respond to fire breakouts. Building facilities will be provided with appropriate fire escape routes. A secure emergence assembly point will be designated.

2.11.7 Information and Education

Clear warnings and information will be placed at strategic locations around the project area. In case of an emergency a system for notifying neighbourhood 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.

2.12 Gender analysis and mainstreaming

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

2.13 Project Boundaries

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

2.13.1. Institutional boundaries

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

- Ministry of Education Science and Technology (MoEST)
- Iringa Municipal Council
- Tanzania Commission of Universities (TCU)
- Fire and Rescue Force
- Occupational Safety and Health Authority (OSHA)
- IRUWASA
- RUWASA
- TANESCO

- Mtwivila, Mkwawa and Ilala community

2.13.2 Temporal boundaries

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

2.13.3 Spatial boundaries

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

i. Starting with the **core impact area** (where the project is located). In this case, the core impact area for the project will be Mkwawa ward (where project will be located) and its nearby areas (Mtwivila and Ilala wards) as where the impact will be felt.
ii. 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 Iringa Municipal Council in general which will benefit from revenues paid by the investor and from different social economic activities.
iii. 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 centres of decision making that can influence the development of proposed project. These centres of decision-making include Ministry of Education Science and Technology (MoEST), and Tanzania Commission of Universities (TCU).

2.14 Project cost and Duration

MUCE has received financial support from the World Bank (WB) through the Ministry of Education, Science and Technology (MoEST) under the project named Higher Education for Economic Transformation (HEET) which is about USD 5,935,531.84 (Table 2.3). The project implementation is estimated to take 18 months after commencement. Specifically, under this project the College intends to use part of funds received to construct four buildings, which are

Science Building, Multimedia and Special Needs Education Building, Students' Hostel Building and Physics Laboratory Building.

CHAPTER 3: POLICIES, LEGAL AND INSTITUTIONAL FRAMEWORK

3.1 Introduction

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 prescribes and enforces specific operating environmental procedures and standards.

The regulations on environmental management in the country are mainly vested on two public institutions namely 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 sectorial and cross–sectorial policies that provide directives on how the project should operate in relation to the concerned environmental and socioeconomic settings. The proponent shall continue to consult these policies while implementing the project activities.

3.2.1 The National Environmental Policy, 2021

The NEP appropriately sets broad goals committing Tanzania to ensure environmental conservation and sustainable development of its natural resource's heritage. The policy provides the framework for the formulation of plans, programmes, and guidelines for the achievement of sustainable development.

The policy ensures that environmental concerns received due weight and balance consideration in reconciling urgent development needs and long-term environmental sustainability. The Policy sets broad goals committing to sustainable development of its natural resources heritage. 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.

Compliance: *MUCE has observed one of the requirements of the national environmental policy by putting measures to control and minimizing pollution that will happen during constructions and operational period.*

3.2.2 The National Land Policy (2019)

The National Land Policy emphasizes the importance of undertaking EIA for the management of land-based development. Additionally, the policy advocates the protection of land resources from degradation for sustainable development.

The aim of National Land Policy is to promote and ensure a secure land tenure system, to encourage the optimal use of land resources, and to facilitate broad-based social and economic development without upsetting or endangering the ecological balance of the environment. The specific objectives of this National Land Policy are; to promote an equitable distribution of and access to land by all citizens. To ensure that existing rights in land especially customary rights of small holders (i.e., peasants and herdsmen who are the majority of the population in the country) are recognized, clarified, and secured in law, set ceilings on land ownership which will later be translated into statutory, ceilings to prevent or avoid the phenomenon of land concentration (i.e., land grabbing). To ensure that land is put to its most productive use to promote rapid social and economic development of the country, modify and streamline the existing land management systems and improve the efficiency of land delivery systems, streamline the institutional arrangements in land administration and land dispute adjudication and make them more transparent. In addition, it promotes sound land information management and to protect land resources from degradation for sustainable development.

Compliance: *MUCE is committed to taking actions to align with land policy while also promoting the social and economic progress of a nation. Also, MUCE comply with this policy because the proposed building project is located within the area planned for building construction and as such it is compatible with the land use in the project area as required by the National Land Policy*

3.2.3 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.

Therefore, the proponent will insure among the following from this regulation: All construction materials shall be sourced from licensed dealers; all wastes will be deposited in the designated municipal dumpsite for those which can be recycled or reused will accordingly adhere.

Compliance: *MUCE shall observe this policy by ensuring that the proposed project is in-line with this policy as ultra-modern technology shall be used during construction and its operation. Implementations of the proposed project will, as much as possible, make use of cost effective and environmentally friendly technologies to minimize wastage of resources (building materials, water, and energy).*

3.2.4 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.

Compliance: *MUCE shall abide by this policy by employing Tanzanians who have the required qualifications as well as unskilled.*

3.2.5 National Policy on HIV/AIDS (2001)

This policy provides a framework for leadership and coordination of the National multi-sectoral response to the HIV/AIDS epidemic. One of the major objectives of the policy is to strengthen the role of all sectors, public, private, NGOs, faith groups, CBOs and other specific groups to ensure that all stakeholders are actively involved in HIV/AIDS work and to provide a framework for coordination and collaboration. 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 behaviour and attitudes of employees and employers alike shall be part of HIV/AIDS intervention in the workplace.

Compliance: *MUCE 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.*

3.2.6 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.

Therefore, this policy advocates for opportunities to both men and women in projects including road works and related activities, and for women to be involved at all levels of the project planning to implementation

Compliance: *MUCE shall observe this policy by ensuring Environmental and Social specialist from MUCE and Contractor establish and implement all gender sensitive plans and strategies in all departments. Also ensure that women will be adequately involved at all levels of project planning to implementation.*

3.2.7 The National Energy Policy (2015)

This policy outlines measures to adopt clean technology and minimize energy losses. It states that energy is a prerequisite for the proper functioning of nearly all sub sectors of the economy. It is an essential service whose availability and quality can determine the success or failure of the development endeavours. In the institution sector, the policy advocates the adoption of renewable energy options. Furthermore, the policy calls for efforts to promote switching from diesel to other environmentally friendly or alternative sources such as renewable energy (solar power) as part of the energy source.

Compliance: *MUCE shall abide to the policy through the use electricity from national grid as well as renewable energy systems such as solar PV at the site. Also, MUCE will ensure proper demand side management through sustainable use of energy to ensure that it does not contribute to carbon footprints.*

3.2.8 The National Water Policy (URT, 2002)

The National water policy recognizes that; there is a growing scarcity, misuse and wastage of water resources in many places of Tanzania which may become a serious threat to sustainable availability of the resource; Existence of uncontrolled abstraction of water resources; Existence of ecological minimum flow levels of surface water flow to sustain ecosystem's flora and fauna; The state of the quality of water resources is not comprehensively known and no regular monitoring is done due to inadequacy of resources and institutional capacity; and water resources are one of the major agents for socio-economic activities. Various socio-economic water uses activities compete for limited resources particularly during droughts and times of scarcity. A criterion for prioritization of water uses at different times of year to address the growing competition for water is lacking, resulting into conflicts among users. The policy, however, states that priority in these circumstances shall be the supply of domestic water and the water needed to maintain ecosystem functioning; inadequate linkage between water and land development results in pressures on water resources. With the on-going liberalization, there is a need to have co-ordination mechanism to facilitate smooth linkage.

The policy, however, states that priority in these circumstances shall be the supply of domestic water and the water needed to maintain ecosystem functioning; inadequate linkage between water and land development thus, resulting in pressures on water resources. With the ongoing liberalization, there is a need to have co-ordination mechanism to facilitate smooth linkage.

Compliance: *The proposed project shall be designed in such a way that water use is kept to the minimum by, for example, installation plumbing fixtures such as faucets and flushing cisterns, which minimizes water use. It will also ensure that pollution of water sources is avoided or minimized during the construction and operation phases.*

3.2.9 The National Health Policy (URT 2017)

The Policy emphasizes on the need for increasing community involvement in health development and improved access and equity in health and health services. One of the main objectives of this policy is to ensure that health services are available and accessible to all people wherever they are in the country, whether in urban and rural areas. The policy encourages safe basic hygienic practices in workplaces, promote sound use of water, promotes construction of latrines and their use, encourage maintenance of clean environment; working environment which

are conducive to satisfactory work performance. The policy is relevant to the project responsible to provide safe environment during project implementation as well as to implement safety measures, regulations, and precautions.

Compliance: *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.*

3.2.10 Education and Training Policy (2014)

The Education and Training Policy, 2014 stresses that for improvement of the quality of education in Tanzania there should be a shift from using many textbooks into using single textbook for each subject. The policy also emphasizes all private schools need to have affordable school fees based on "Unit per course" and analyse its operation as well. The school fees should relate with the service offered by the school. This project is in-line with this policy as will modernize education training and put in place the state-of-the-art equipment for training. Also, the school fees will be affordable to all people.

Compliance: *MUCE through HEET will increase teaching and learning infrastructure which at the end will increase enrolment of the students.*

3.2.11 National Mineral Policy (2009)

The National Mineral Policy also addresses that the mining activities should be undertaken in a sustainable manner. Reclamation of lands after mining activities is recommended. As far as this project is concerned, mining activities is directed to quarrying activities for obtaining stones and aggregates.

Compliance: *No mining activities will be undertaken by proponent within the project area as raw materials (Fine and coarse aggregates) for the proposed projects shall be bought from authorized vendors.*

3.3 Relevant Legal Framework

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

3.3.1 Environmental Management Act No. 20 of 2004

The Environmental Management Act (EMA), Cap 191 seeks to provide legal and institutional framework for sustainable management of the environment in the implementation of the National Environmental Policy. The Environmental Management Act provides for continued existence of the National Environmental Management Council (NEMC). Under this Act, NEMC is mandated to undertake enforcement, compliance, review, and monitoring of environmental impact assessment and has a role of facilitating public participation in environmental decision making, exercise general supervision and coordinating over all matters relating to the environment. Other sections where Proponent should be aware on them are Environment Management Act Cap 72 that emphasize on land users and occupiers shall be responsible for the protection, improvement and the minister may prescribe nourishment of the land and for using it in an environmentally sustainable manner. EMA Cap 110 (1) say; No person shall discharge any hazardous substance,

chemical, oil or mixture containing oil in any water or any other segment of the environment except in accordance with guidelines prescribed under this Act. The HEET project must conform to all requirements of environmental clearance and safeguards, which include EIA, Auditing, Monitoring, and implementation of the environmental and social management plans for the project.

The Act is relevant to the project because it is expected to have some negative impacts to the environment during its implementation. The act requires the EIA report to be submitted to NEMC for review and subsequently issuance of Environmental Impact Assessment Certificate.

Compliance: *All section shall continue to be observed by Proponent to protect the environment against any sort of pollution (refer to the Environmental Management Plan of this report).*

3.3.2 The Land Act, 1999, CAP 113 R.E. 2019

The purpose of this law is to make sure that the general idea and aim of the National Land Policy are acted on. The Act seeks to control the land use and clarify issues pertaining to ownership of land and land-based resources, transactions on land and land administration. The law provides for technical procedures for preparing land use plans, detailed schemes, and urban development conditions in conformity with land use plan and schemes.

Compliance: *Therefore, during project implementation, the Act will be observed by the proponent. As a first step the project proponent agreed to conduct the ESIA to guide project operations. The land is owned by the project proponent and title deed for the proposed project land is attached in Appendix 2.*

3.3.3 The Urban Planning Act (2007)

The law provides for the orderly and sustainable development of land in urban areas, to preserve and improve amenities; to provide for the grant of consent to develop land and powers of control over the use of land and to provide for other related matters.

Compliance: *The project will seek planning consent and building permits from relevant authorities.*

3.3.4 Occupational Health and Safety Act (2003)

The law requires employers to provide a good working environment to workers to safeguard their health. The employers need to perform medical examinations to determine fitness before engaging employees. Also, 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 workplace.

The Act has relevant to the project because it will involve construction of buildings. Therefore, project is responsible to provide to workers /constructor/ students with a safe environment during project implementation. In addition, the project construction sites are required to implement safety measures, regulations and precautions and ensure health and welfare of workers and proper handling of hazardous materials and chemicals.

Compliance: *The Proponent/Contractor will acquire a certificate of registration of a workplace from OSHA to abide to the law.*

3.3.5 The Engineers Registration Act and its Amendments 1997 and 2007

This Act establishes an Engineering Registration Board (ERB) which regulates the conduct of engineers, to provide for their registration and for related matters. The Act provides restrictions that no person other than a registered engineer shall engage in professional engineering work or services which includes professional service consultation, planning, designing or responsible supervision of construction or operation in connection with any public or privately owned public utilities, buildings, machines, equipment, processes, works or projects where public interest and welfare, or the safeguarding of life, public health or property is concerned or involved, and that requires application of engineering principles and data. Furthermore, the Act stipulates that no person shall employ or continue to employ - any engineer who is not a registered as a professional engineer.

Compliance: *MUCE shall engage registered engineers to observe the provisions of the Act when executing its activities.*

3.3.6 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.

Compliance: *The proponent shall therefore appoint a registered contractor and make sure that the provisions of the Act are adhered to.*

3.3.7 The Architects and Quantity Surveyors Act 1997

This Act was enacted by the parliament to provide for establishment of a board to regulate the conduct of Architects and Quantity surveyors and architectural and quantity surveying consulting firms in Tanzania. The board is vested with powers to inspect premises or construction sites to verify whether the rules and regulations of carrying out construction projects are adhered by consulting firms. This is aimed at ensuring that appropriate professionals who are registered by the board are involved in undertaking works as required by the law.

Compliance: *Therefore, the proponent should abide by this Act by carrying out construction by adhered consulting firm.*

3.3.8 Public Health Act, 2009

The Act provide for the promotion, preservation, and maintenance of public health with a view to ensuring the provisions of comprehensive, functional, and sustainable public health services to the general public and to provide for other. The Proponent shall observe Part IV of the Act which relates to sanitation, housing, and hygiene. The Part also makes provisions for matters relating to nuisance, housing and human settlement, waste management, sewerage, and drainage.

This Act is relevant to the project especial through Section 66 of the Act state that: *(1) A block or premises shall not be erected without first submitting the plans, sections, and specifications of the block site for scrutiny on compliance with public health requirements and approval from the Authority.*

Compliance: *The Proponent will observe this Act by promoting and preserve the public health.*

3.3.9 Fire and Rescue Force Act, 2007

The act empowers the commissioner general of the force or his agent to enter premises to ascertain any contravention of provisions of the Act and obtain information required for firefighting purposes. A court may issue an order for a closure or prohibit the use of any premises for human habitation or storage in case there is failure to comply with fire prevention regulations. The Act also obliges the owners and managers of the structures to set aside places with free means of escape, and install fire alarm and detection systems, or such other escape and rescue modalities in the event of fire.

Compliance: *The Proponent abides to this Act by making sure that the awarded Contractor and their employees undergo fire and rescue training and must have a certificate for compliance. Also, should make sure all the design structure and the site layout plan shall be submitted to Fire and Rescue Force for approve.*

3.3.10 Employment and Labour Relations Act (No.6), 2004

The Act prohibits forced labour and discrimination of any kind in the workplace. It provides employment standards such as contracts with employees, hours of work, remuneration, leave, unfair termination of employment, and other incidents of termination. The Act makes provision for core labour rights, to establish basic employment standards, the framework for collective bargaining, prevention and settlement of disputes, and other related matters. The Act strictly prohibits child labour and discrimination.

Relevance: The project operators should ensure all labour discrimination at workplace should be prohibited during the all the phases of the project, which will bring economic justice to the employees and labour rights to be observed.

Compliance there of*: The project complies with all employment rights to be observed for the project development. MUCE will ensure that it operates within the requirements of this legislation and will comply with stipulated conditions of the Employment and Labour Relations Act, 2004.*

3.3.11 Social Security Authority Act Camp 135 R.E 2015

An Act to provide for the establishment of a National Social Security Fund and to provide for its membership, the payment of contributions to, and the payment of benefits out of, the fund and for other purposes connected therewith. The provision of this act establishes the board of directors as the core administrative unit for the management of the fund. In addition, the Act elaborated about the Eligible employee, Compulsory registration of employers and eligible employees, excepted employment, what is required for the Cancellation of registration and Voluntary membership. The Act also provides for Description of benefits based on Age, the

conditions for Withdrawal of benefit, Invalidity of benefit, Survivor's benefit and Regulations regarding benefits. The employer is obliged to make sure the employees are registered to the fund and getting all services provided by the fund.

Compliance: *Developer will respect the provisions of the National Social Security Fund Act by making sure all employed workers are registered on Social Security Funds.*

3.3.12 The Workers' Compensation Act, 2015

The Act to provide for the compensation to employees for disablement of death caused by or resulting from injuries or diseases sustained or contracted in the course of employment, to establish the Funds for administration and regulation of worker's compensation and to provide for related matter. The Act applies to both workers in the private and public sectors. For one to be compensated, the injury must either cause permanent incapacity or make the worker unable to earn full wages for at least three consecutive days. The employer is obliged to pay compensation irrespective of the cause of accident. It does not matter whether the incapacity or death was due to recklessness of the worker. Where injury occurs, an employee is entitled to recover medical expenses and lost wages resulting from the disability, be it temporary or permanent, the law allows for compensation to defendants or personal representatives where the worker is dead.

Compliance: *The Proponent shall comply with this act by ensuring that all workers from Contractor shall be compensated accordingly in this manner and registered to WCF.*

3.3.13 Prevention and Control of HIV/AIDS Act, 2008

The Act focus basically on the provision of the prevention, treat, care support and control of HIV and AIDS, for provision of the public health in relation to HIV and AIDS, to provide for an appropriate treatment, care and support using available resources to people living with or at risk of HIV and AIDS and to provide for related matters under this Act. Further, the Act stipulates the following: Section 4(1) gives details of promotion of public awareness on cause, mode of transmission, consequences, prevention and controls of HIV and AIDS. In addition, it describes mode of reduction in spreading, prevalence of STI's in the population and adverse impacts resulting from HIV and AIDS as well as protection right of orphans.

Also, Section 19(2) describes the provision of community-based HIV and AIDS prevention, support, and care services. The project may involve construction of a workers' camp site, this may lead to the possible interaction between the workers and the local community members, which may lead to the increased transmission of HIV / AIDS to both the workforce and the local communities.

Compliance: *The Proponent shall operate within the requirements of this legislation in addition to those of the HIV policy.*

3.3.14 Standard Act of 2009

The Standards Act has established the National Environmental Standards Compendium (NESC) which is a collection of various standards prepared at different times and recognized by EMA 2004. TBS comprises of standards that require compulsory compliance. Compulsory standards are categorized as generic or specific. Specific standards cover those industries with peculiar

effects to the environment while other industries without a specific standard for Tolerance Limits of Emissions discharge including water quality, discharge of effluent into water, air quality, control of noise and vibration pollution, sub-sonic vibrations, soil quality, control of noxious smells, light pollution, and electromagnetic waves and microwaves. It also has the requisite test methods that should be followed when testing for compliance.

The test methods included are referred to in at least one of the specification standards appearing under Part 1. The proposed MUCE project will adhere to the Act requirements during the implementation.

Compliance: *MUCE shall observe this Act and regulatory requirements and implement the mitigation measures proposed in this document to comply with the provisions of these Regulations on abatement of air pollution. Also, the project shall comply with all the procedures that require according to environmental best practice.*

3.3.15 Universities Act No. 7 of 2005

Universities Act No. 7 of 2005 provides for establishment of the Tanzania Commission for Universities (TCU) to provide the procedure for accreditation of institutions of higher learning and other related matters. The proposed project at MUCE will be regulated by the Tanzania Commission for Universities (TCU) for ensuring that quality education is offered, which meets the needs of all the stakeholders in line with this Act.

Compliance: *MUCE should ensure Tanzania commission for universities (TCU) provides procedures to higher education accreditation in the institution of the project, which will bring to the people related to on the project. The project complies with all the procedures of the universities act to be consulted for the project development.*

3.3.16 The Education (Amendment) Act, 1995

This Act establishes the Higher Education Accreditation Council, to provide the procedure for accreditation and other related matters. Among other functions, the council accredits higher education institutions; approve admissions into state institutions of higher education, to examine and approve proposals for courses of study and course regulations submitted to it by institutions of higher education; make regulations in respect of admission of persons seeking to enrol in state institutions of higher education and to provide a central admission service to higher education institutions; and make visitations and inspection of higher institutions. MUCE under HEET project will be monitored by Accreditation Council.

3.3.17 The Law of the Child Act, 2019

An act to provide for the reform and consolidation of laws pertaining to children, to specify children's rights, to advance, safeguard, and maintain a child's welfare in order to give effect to international and regional conventions on children's rights; to provide for affiliation, foster care, adoption, and custody of the child; to further regulate employment, apprenticeship; to make provisions with regard to a child in conflict with the law; and to provide for related matters. A person/company shall not employ or engage a child in any kind of exploitative labour.

Compliance: *Contractor and MUCE together will ensures that no child under fourteen years is involved as an employee in any kind of work during the project implementation. This can be archived by setting small rules and regulation to guide the activities within the site.*

3.3.18 The Water Resource Management Act, No. 11 of 2009

The Act is a principal legislation dealing with the protection of water resources and control of water extraction for different uses. According to section 39 (1) of this act, "*owner or occupier of land on which any activity or process is or was performed or undertaken, or any other situation exists which causes has caused or is likely to cause pollution of a water source, shall take all reasonable measures to prevent any such pollution from occurring, continuing or recurring*". In general, the Water Resource Management Act provides the legal basis among others for:

(i) Water resources management at National and Basin levels.

(ii) The administration to legalize, grant, modify and diminish water rights to the use of water by those entrusted with responsibilities for water resources management.

(iii)To protect water rights for all legitimate water users, hence monitoring the quality and quantity of water sources.

(iv) Water use conflict management.

(v) Water pollution control and other related issues like water supply and any related infrastructure construction

Compliance*: The proponent by undertaking this study complies with the requirements of the Act.*

3.3.19 The Water Supply and Sanitation Act No. 5 of 2019

The Act states obligations of water supply and sanitation authorities to provide water supply and sanitation services, indicates their functions, powers and duties. Consequently, it gives responsibilities for provision of adequate and reliable water supply and sanitation services in urban areas to Urban Water Supply and Sanitation Authorities (WSSA). With respect to their responsibilities to ensure adequate and reliable service provision, the Act gives power to WSSA to enter any land for the purpose of laying water pipe network and charge fees to facilitate financial obligation necessary for operation and maintenance of the water supply and sanitation networks.

Compliance*: The proponent shall use clean to water from Iringa Water Supply and Sanitation Authority.*

3.3.20 The Roads Act No. 13 of 2007

The Roads Act governs the deviation, widening, construction or realignment of a road or access road, as well as describing the compensation details for people that need to be resettled. Section 35 describes owner to be given power concerning the decision of creating an access road in line with laid conditions. Section 39 and regulation 42 detail the prohibition of certain classes of traffic, and sets out maximum weight, speed and dimensions of vehicles. Section 40 provides the chance for appeal to the proponent if not given consent for the proposed access road construction. Furthermore, the Act provides for road safety through creating road signs and bumps to avoid any occurrence of accidents, and the authority that has jurisdiction for carrying out road undertakings.

***Compliance**: The proposed project shall utilise the current public roads and therefore obliged to observe the requirement of this Act.*

3.3.21 The Local Government (Urban Authorities) Act, Cap. 288 R.E 2009]

This Act establishes urban authorities for the purposes of local government, to provide for the functions of those authorities and for other matters connected with or incidental to those authorities. 45. Section 55 of the Act enumerates basic functions of the urban authorities. The functions that are relevant to proposed project are:

- To provide for the prevention and abatement of public nuisances or of nuisances, which may be injurious to the public health or to the good order of the area of the authority?
- To regulate any trade or business, which may be noxious, injurious to the public health or a source of public danger, or which otherwise it is in the public interest expedient to regulate, and to provide for the issue of licenses or permits to facilitate the regulation of any such trade or business, and for the imposition of fees in respect of such licenses. Section 80 of the Act empowers the urban authorities to set by-laws.

***Compliance**: The proponent shall observe these and other relevant provisions in this Act.*

3.3.22 The Local Government Law (Miscellaneous Amendment) Act, 2006

The Act established the local governments and urban authorities with mandates to spearhead developments in districts and urban centres (for cities and municipalities) respectively. By this law, the authorities have mandates to formulate bylaws to enhance environmental management within their district/urban authorities.

***Compliance**: Thus, the proponent shall observe the bylaws set by Iringa Municipal Council.*

3.3.23 The Persons with Disability Act, 2010

The basic principles of this Act are to respect for human dignity, individual's freedom to make their own choices and independence of persons with disabilities, non-discrimination, full and effective participation and inclusion of persons with disabilities in all aspects of society, equality of opportunity, accessibility, equality between men and women with disabilities and recognition of their rights and needs, and provide a basic standard of living and social protection.

***Compliance:** The project proponent shall fulfil this legal requirement in all project phases, from design, construction and operation.*

3.4 Relevant Regulations and Guidelines

3.4.1 Environmental Impact Assessment and Audit (Amendment) Regulations (2018)

The Environmental Management (Environmental Impact Assessment and Audit) Amendment Regulations, 2018 are read as one with the EIA and Audit regulations, 2005 are made under Environmental Management Act No. 20 of 2004. The regulations provide the basis for undertaking Environmental Impact Assessment (EIA) and Environmental Audits for various development projects with significant environmental impacts in the country. These Regulations set out the EIA procedure and regulatory system for carrying out EIA in Tanzania that requires every Developer to follow. This EIA has been carried out in accordance with these Regulations i.e., Registration of the project with NEMC, screening exercise, producing scoping report

(including development of ToR), and ESIA report. The ESIA report considers environmental, social, cultural, economic, and legal considerations, identify anticipated impacts, analyses alternative options, propose mitigation measures, and develop management plans.

According to the Tanzania Environment Impact Assessment and Audit Regulation of 2005, which was updated in 2018, project activities that are eligible for funding will be divided into groups based on how much each subproject would affect the environment and society. That is, whether the effects are site-specific, low impact, and preventable or mitigated provided all parties involved implement the preventative and mitigation strategies.
The First Schedule gives list of projects requiring and not requiring EIA and it categorizes projects into four categories:

Type A – Category for mandatory project
Type B1 – Category for borderline project
Type B2 – Category for Non-Mandatory and
Special Category – project where potential risks are uncertain and requires detailed specialized study prior to EIA

According to the schedule, Type B2 Projects are small scale activities and not enterprises and shall require registration but shall not require EIA. Further the project shall not require screening and scoping, rather the project brief shall be examined and issued with the Environmental Impacts Assessment Certificate.

Regulation 6(1), 8(1) and 10(1) provide procedures for application for EIA certificate for B2, B1 and A categories respectively. The Regulations also, specifies issues to be covered by the proponent in the project brief and scoping reports. Section 6 (2) requires a project brief to be prepared by an environmental expert registered as such under the environmental (Registration of Environmental Experts) Registrations.

Part IV Regulation 13(1) requires the Project Proponent to conduct EIA in accordance with the general environmental impact assessment guidelines and in accordance with the steps outlined in the Fourth Schedule of the regulations. Regulations 16 specifies EIA study should cover environmental, social, cultural, economic and legal issues.

Part X Regulation 49 and 50 outlines the objectives of carrying out annual self-auditing and control audit to check and verify the adequacy the environmental management plan in mitigating the negative impacts of the project.

Part XII Regulation 60(1) stipulated that "notwithstanding any license, permit or approval granted under any written law, any person who commences, proceeds with, executes or conducts any project or undertaking without approval granted under these Regulations commits an offense and on conviction shall be liable to the punishment prescribed under the Act.

The regulation is relevant to the MUCE project as may falls under Type A, B1 or B2 and therefore project registration or EIA study is mandatory and should be carried out in accordance with the guidelines stipulated in the Fourth Schedule to the Regulations.

Compliance: *MUCE has carried out this ESIA, hence, the requirements of these regulations are observed.*

3.4.2 The Environmental Management (Registration and Practicing of Environmental Experts) Regulations, 2021

Section 83 of the EMA (2004) stipulates that the Environmental Impact Assessment shall be conducted by experts or firms of experts whose names and qualifications are registered by NEMC. The NEMC maintain a registry of EA and EIA experts. These regulations also set the code of practice of the experts for which the Environmental Impact Assessment experts for this project subscribe.

Compliance: *MUCE has carried out this ESIA by the registered expert by NEMC. Hence, the requirements of these regulations are observed.*

3.4.3 The Environmental Management (Fee and charges) (Amendment) Regulations, 2021

The Regulations specify the amount of environmental fees for various operating projects and other fees for assessment. Of particular importance to this project is annual fees to enable the Council to undertake to monitor and audits to ensure the environmental obligation stipulated in the EIA report is adhered to during all project phases.

Compliance: *MUCE shall adhere to these regulations by paying the required fees timely to the Council.*

3.4.4 Environmental Management (Air Quality Standards) Regulations, 2007

The objective of this standard is to set baseline parameters for air quality and emissions within acceptable standards. It enforces minimum air quality standards prescribed by NEMC to industrialists for the purpose of adopting environmentally friendly technologies to ensure protection of human health and environment pollution sources. The proposed project will have to abide to Environmental Management (Air Quality Standards) Regulations 2007, and the current assessment is within the required standards. During project implementation the regulations will be complied with to ensure dust emissions from the project are within the acceptable limits.

Compliance: *MUCE will ensure that all emissions will be within recommended standard level.*

3.4.5 Environmental Management (Soil Quality Standards) Regulations, 2007

The objective of this standard was to set limits for soil contaminants in agriculture and habitat. It enforces minimum soil quality standards prescribed by NEMC to maintain, restore, and enhance the sustainable productivity of the soil. Elevated levels of heavy metals may occur naturally within the soils surrounding. However, any proposed expansion projects will be designed to avoid the release of contaminants, with elevated levels of heavy metals, to the environment.

Also, these Regulations made by the Minister of State under sections 143, 144 and 230 of the Environmental Management Act, concern soil pollution and soil quality standards and provide with respect to a soil protection permit and compliance system. They also concern measures of enforcement. The object of these Regulations is to;

i. Set limits for soil contaminants in agriculture and habitat.

ii. Enforce minimum soil quality standards prescribed by the National Environmental Standards Committee.

Compliance: *MUCE adheres to this regulation by ensure all trucks and excavator for transportation and loading of raw materials are well serviced to avoid oil spillage. Also, by ensure wastewaters from washroom are directed to their specific treatment.*

3.4.6 Environmental Management (Water Quality Standards) Regulations, 2007

The objective of this standard is to enforce minimum water quality standards prescribed by the NEMC. It ensures all discharges of pollutants take account the ability of the receiving waters to accommodate contaminants without detriment to the uses specified for the waters concerned, to protect human health and conservation of the environment. The project will consider all acceptable practices and regulations.

Compliance: *MUCE abiding to this regulation by ensuring that all liquid waste generated from proposed project and existing infrastructures are treated properly through the public sewer without harm the environment.*

3.4.7 The Environmental Management (Standards for Control of Noise and Vibration Pollution) Regulations, 2015

The regulation prohibits a person to make any loud, unreasonable, and unnecessary on unusual noise that annoys, disturbs, injures, or endangers the comfort, repose, health or safety of others and of the environment describes the permissible noise levels from different facilities. The provisions of these regulations will guide in ensuring that noise and vibration levels do not exceed the maximum thresholds specified.

Compliance: *MUCE ensures that these regulations are adhered by ensuring noise and vibrations produced during construction period are within acceptable limit.*

3.4.8 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.

Compliance: *MUCE abides by the regulations by ensuring that all solid waste generated during construction and operation phase are handled properly and does not lead pollution to the surrounding environment.*

3.4.9 Environmental Management Act (Hazardous Waste Control) Regulations, 2021

These regulations have been made under Section 110(4) and (5), 128, 133(4), 135 and 230(2) of the Environmental Management Act, 2004. The Regulations state that all individuals residing in Tanzania have an obligation to take responsibility for preserving the environment and protecting it from the negative impacts of hazardous wastes. Furthermore, they are required to notify the

appropriate authorities about any hazardous waste-related activities or occurrences that may potentially harm the environment and human well-being.

These regulations apply to all categories of hazardous waste and to generation, storage, disposal and their movement into and out of mainland Tanzania. These regulations require that any person dealing with hazardous waste in Tanzania be guided by the following principles of environment and sustainable development:

- The precautionary principle,
- Polluter pays principle, and
- The producer extended responsibility

Compliance: *The MUCE will abide to the requirement of the regulations.*

3.4.10 The Environmental Management (Control and Management of Electrical and Electronic Equipment Waste) Regulations, 2021

The Regulations apply to all categories of electrical and electronic equipment wastes with respect to generation, collection, storage, transportation, importation, exportation, distribution, selling, purchasing, recycling, refurbishing, assembling, dismantling and disposal of electrical and electronic equipment waste or components, and their movement into or outside Mainland Tanzania. The amount of waste electrical and electronic equipment (widely known as WEEE or e-waste) generated every year in Tanzania is increasing rapidly.

Waste from electrical and electronic equipment includes a large range of devices such as computers, printers, fridges and mobile phones at the end of their life. This type of waste contains a complex mixture of materials, some of which are hazardous. These can cause major environmental and health problems if the discarded devices are not managed properly. These regulations require the separate collection and proper treatment of WEEE and sets targets for their collection as well as for their recovery and recycling.

Compliance: *Thus, MUCE shall ensure compliance with all these requirements during the implementation of the project.*

3.4.11 The Environmental Management [Control of Ozone Depleting Substances] Regulations, 2007

The regulations show the products which having ozone depleting potentials which include automobile and truck conditioning units (whether incorporated in vehicles or not). Also, the regulations list domestic and commercial refrigeration and air conditioning or heat pump equipment when containing controlled substances as a refrigerant or insulating material of the product. These include:

- Refrigerators
- Freezers
- Dehumidifiers
- Water coolers
- Ice machines and
- Air conditioning and heat pump units

Some of the components such as air conditioners, refrigerators and vehicles will be found at the proposed establishment. There will be emission of dust during offloading raw materials as well as loading of finished products if there will be improper management. There will be frequency movement of vehicles, workers and visitors especially during construction phase to deliver raw materials for proposed establishment at MUCE.

Compliance: *The proponent should adhere to this Act so as not to participate in ozone depleting and pay pollution cost when needed.*

3.4.12 The Industries and Consumer Chemicals [Management and Control] Regulations, 2020

The Industrial and Consumer Chemicals Act provides for proper management and control of industrial and consumer chemicals in Mainland Tanzania. It requires that any person dealing in industrial chemicals has to register with the Industrial and Consumer Chemicals Management and Control Board. The Third Schedule of the Act provides a long list of chemicals that must be registered. In case the proponent imports chemicals for its activity's compliance with requirement of this law during the importation, storage, use and disposal of those chemicals is of paramount importance.

Compliance*: The proponent will use chemicals in the laboratories that are already registered in Tanzania. Further, the proponent will not import any chemical but rather will acquire them from large importers available in the country.*

3.4.13 The Urban Planning (Use Groups and Use Classes) Regulations, 2018

These regulations have been made under section 77(1)(i) of the Urban Planning Act (Act No. 8 of 2007). This regulation is made for the purposes of planning and the control of development, all uses of land and buildings are categorized in the use groups and use classes in the First Schedule. For proposed establishment at MUCE regarding MUCE title deeds it follows under Use Group K – Educational Buildings and Use Class: (d) Schools/Faculties, institutes, colleges, university colleges and universities.

Compliance: *The Proponent abide to the requirement of the regulations because the lands and the buildings erected thereon lands shall be maintained and the same shall be used for Educational Purposes, Use - Group K, use class (b) as defined in the town and Country planning (Use classes) Regulations, 1960 as amended in 1993.*

3.4.14 The Urban Planning (Application for Planning Consent) Regulations, 2018

These regulations have been made under section 77(1)(o) of the Urban Planning Act (CAP. 355). The regulation state that no person shall carry out any development within the Planning Area without a planning consent granted by the Planning Authority under section 32 of the Act and these Regulations. Also, these regulations declare that where the proposed development involves any building or engineering or mining work in, on, under or over any land or premise

i. a block plan to a scale of not less than 1:500 sufficient to show the boundaries of the property;

ii. plans to a scale of 1:100 showing all elevations fronting a street or open space together with a list of external materials to be used, and floor plans showing the proposed use of each floor and internal division where possible;
iii. a site plan, scale of not less than 1:500, where necessary to identify the site.

Compliance: *The Proponent will abide to the requirement of the regulations.*

3.4.15 The Urban Planning (Zoning of Land Uses) Regulations, 2018

The regulations were formulated under section 77(1)(d) of the Urban Planning Act (CAP. 355). For the purposes of these Regulations, uses of land that are permitted and those that may be permitted under special circumstances by the planning authority in different zones of the local planning area shall be as follows: Residential, Commercial (Retail and Wholesale), Industrial (Light, Medium, Heavy & Service), Institutional, Public Utilities, Beach, Open Spaces and Recreational, Transportation, Communication and Microwave towers, Agricultural, Water bodies, Conservation and Economic Development.

Hence for Institutional zone the regulation declare that all central and local government offices, agencies and centre offices, educational, college campus including hostel facilities for students, cultural and religious institutions such as church, temple and other places of worship, educational, medical/engineering/ technical and research institutions, (on the sites having minimum 2 hectares with a minimum of 12 metre wide approach road), including libraries, reading rooms and clubs, medical and health institutions, recreational areas, public toilets, parking and cafeteria, cultural institutions like community halls, opera houses, clubs, predominantly non-commercial in nature, utilities and services, water supply installations including disposal works, electric power plants, high tension and low tension transmission lines, sub stations, gas installation and gas works, firefighting stations, banks, and quarters for essential staff and all uses permitted under parks and playgrounds.

Compliance: *The Proponent will abide to the requirement of the regulations during design and construction period.*

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

The Urban Planning Space Standards provides guidance on space utilization to achieve harmony and sustainable development. In construction of buildings under HEET project at MUCE, this document informed design of the buildings and selection of construction sites. Space standards provide suitable heights for buildings according to their use, guide space to be reserved between one building and another (setbacks), plot coverage and plot ratio. It also guides provision of space to accommodate both motorized and non-motorized transport systems such as roads, parking, and footpaths/pedestrian walkways.

Compliance: *The HEET project at MUCE has taken into consideration the requirements of urban planning space standards in inception and design of buildings to be constructed and will continue taking proper utilization of project area during its implementation.*

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: *MUCE 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) in Tanzania. 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 the Ministry of Education, Science and Technology (MoEST) and its associated agencies tasked with implementing and monitoring any part of HEET, including TCU, HESLB and COSTECH; as well as by participating Higher Education Institutions (HEIs). 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 Project Appraisal Document (PAD)

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

3.6 Relevant International Agreements, Conventions and Treaties

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

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

3.6.1 United Nations Framework Convention on Climate Change (1992)

The objective of the United Nations Framework Convention on Climatic Change (UNFCCC) is to stabilize the concentration of greenhouse gas (GHG) in the atmosphere, at a level that allows ecosystems to adapt naturally and protects food production and economic development. Since Tanzania is a Party to the Convention, she will have to account for all sources of GHG in her future National Communications. Undertaking of this ESIA study will enable the country to identify some of the GHG that will be emitted by the project activities.

Compliance: *MUCE 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 Tanzania is among the parties to the agreement, she will make profound changes to its economy to achieve this goal.

Compliance: *MUCE 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 soiled 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 utilisation of genetic resources.

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

Compliance: *MUCE 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: *MUCE 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 Organization (ILO)

International Labour Organization (ILO) Conventions ratified by Tanzania include: C138 Minimum Age Convention of 1973, which prohibits child labour, and C182 Worst Forms of Child Labour Convention of 1999. As the conventions have been adopted by the Tanzania Government, MUCE project will abide by them and ensure that no child labour is practiced throughout the project. Other relevant agreements include ILO Convention C148 Working Environment (Air Pollution, Noise and Vibration) Convention of 1977 which protects workers against occupational hazards in the working environment due to air pollution, noise and vibration. The proposed project will ensure workers work in safe environment.

3.7 Institutional Framework

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/Hamlet). According to the Environmental Management Act (EMA) (2004), there is the Environmental Management Committee established at the Hamlet/Village, 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.

3.7.1 Key Institutions to the ESIA process

The proposed project will include all governance levels in the management of environment during HEET execution as shown in Table 3.1.

Table 3.1: Key Institutions to the ESIA process

Level	Institution	Role and responsibility
National Level	Vice President's 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 to ensure that the environment is not degraded. ○ Prepare and issue a report on the state of the environment in Tanzania.
	Vice President's 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;

Level	Institution	Role and responsibility
	Ministry of Lands, Housing, and Human Settlements Development	○ Authority over the national land including the project area. ○ Enforce law and regulations in influence of the project.
	Ministry of Education, Science and Technology (MoEST)	○ To develop and implement Policies on Education, Research, Library Services, Science, Technology, Innovation, Skills, Training Development and their implementation. ○ To improve Basic Education Development through Teachers Training Accreditation and Professional Development. ○ Teachers Professional Standards Development. ○ Schools Accreditation and Quality Assurance. ○ Development of Local Experts in Science, Technology and Innovation. ○ Coordinates roles of Departments, Parastatal Organizations, Agencies, Programmes and Projects under the Ministry.
	Tanzania Commission for Universities (TCU)	○ Mandate to recognize, approve, register and accredit Universities. ○ Conduct regular and impromptu periodic evaluation of universities, their systems, and programmes. ○ Advice the government and the public on matters related to higher education in Tanzania as well as international issues pertaining to higher education, including advice on program and policy formulation and other best practices. ○ Providing support to universities in terms of coordinating the admission of students, offering training and other sensitization interventions in key areas like quality assurance, university leadership and management, fund raising and resources mobilization, entrepreneurial skills, and gender mainstreaming.
	Occupation Safety and Health Authority OSHA	○ Approval of building plans for the proposed project. ○ Monitoring Health and Safety of workers in working premises. ○ Issuing certificates of compliance and oversee occupational safety and health issues. ○ Designated Authority for occupational safety issues
	Fire and Rescue Force	○ To provide professional services in disaster prevention and taming. ○ Approval of building design for the proposed project. ○ To enhance community safety, quality of life and confidence by minimizing the impact of hazards and emergency incidents on people, environment, and

Level	Institution	Role and responsibility
		economy of Tanzania. o To work with other government agencies to minimize impacts of bushfires, storms, floods, landslides, building collapses, motor vehicle accidents and other emergencies. o To run prevention and preparedness programs to prevent emergencies and reduce their impact on the community.
Project Funding Institutions	World Bank	o Project Funding Institutions World Bank o Project financing o Ensure the project is carried out to the highest environmental standards strictly in accordance with the ESIA and the mitigation measures set out in the ESMF. o Provide second line of monitoring compliance and commitments made in the ESMPs through supervision.
Project Proponent	Mkwawa University College of Education (MUCE)	o Project investment and project cycle implementation, monitoring, and auditing; Conducting ESIA study and follow-up on ESIA certificate. o Land acquisition and payment of compensations. o Paying of applicable taxes and charges. o Project operation and decommissioning.
Regional Level	Iringa Region	o Oversee and advice on implementation of national policies at regional level. o Oversee enforcement of laws and regulations. o Advice on implementation of development projects and activities at regional level.
Local Governments Authorities and Communities	Iringa Municipal Council	o Oversee and advice on implementation of national policies at District level. o Oversee enforcement of laws and regulations. o Advice on implementation of development projects and activities at District level
	Ward Offices (Mkwawa, Mtwivila and Ilala)	o Project monitoring (as watchdogs for the environment, ensure the well-being of residents) and participate in project activities. o To extend administrative assistance and advice on the implementation of the project. o Managing the community's relation
	Local communities, NGOs, CSOs and FBOs	o Project monitoring (as watchdogs) o Provides assistance and advice on the implementation of the project. o Part of the project beneficiaries through employment opportunities, income generation and CSR projects.

3.7.2 Key players in the proposed project implementation

To ensure the sound development and effective implementation of the proposed project, it will be necessary to identify and define the responsibilities and authority of the various key project implementers. The following entities will be involved:

- Funding Institutions (for HEET Project World Bank and GoT)
- MUCE
- National Environmental Management Council (NEMC)
- Contractor;
- Supervise engineer/ Consultant

3.7.2.1 Funding Institutions (GoT and World Bank)

The HEET project funders will have an overarching responsibility to ensure that the project is carried out to the highest environmental standards strictly in accordance with the ESF, ESSs and EIS.

3.7.2.2 UPIU-MUCE

The proponent responsibility is to ensure that the implementation process of the ESMP and Mitigation measures are in line with the relevant national policies and legislations and World Bank Environmental and Social Standard (ESS1). MUCE has the Project implementation Unit (PIU) responsible for supervision and monitoring the implementation of the project construction activities. The management of all project activities during operation is under the UPIU, in collaboration with other departments and units depending on the nature of the activity. In general, the UPIU falls under the management of MUCE executing day-to-day activities in the project. The UPIU is guided by management meetings that are chaired by the College Principal. The management meetings provide support, guidance and oversight of the progress of the UPIU. Further, the UPIU has designated the Environmental and Social Safeguard Specialists responsible for supervision and monitoring the implementation of the project. The responsibilities of Environmental and Social Safeguards Specialists will be:

i Provide technical support for the screening of HEET projects for environmental and social safeguards, impacts, and vulnerabilities and identify risk management opportunities/strategies; adherence to the Environmental and Social Framework (ESF);

ii Advise HEI on Environmental and social approaches, policies, and technical issues including social safeguard issues during the preparation and implementation of the HEET project activities;

iii Under the supervision of the project coordinator, monitor compliance of HEET project activities with social safeguards policies or ESF, as appropriate;

iv Participate in conducting safeguard reviews and supervisions of projects, preparing reports, and disseminating lessons learned;

v In collaboration with other HEET specialists, facilitate in building linkages of HEET project with other local leaders and communities and creating understanding and when conflicts arise, finding common ways of conflicts or dispute resolution;

vi In collaboration with other specialists ensure labour and working conditions of labourers in the HEET project related activities follow the agreed national standards;

vii Facilitate establishment or strengthening of the Environmental and Social Counselling Unit to help students and staff including baseline survey or situational analysis of environmental

and social problems including issues related to mental health and may as well include ToR for consultants to conduct the surveys and ensure implementation; and

viii Ensure that the HEI have a well-established mechanism for complaints submission and there are project-level grievance redress mechanisms and can use the WB's Grievance Redress Service.

3.7.2.3 The Contractor

The project will be implemented by a Contractor who will be responsible for the implementation of the proposed project in accordance with the Technical Specifications required. The Contractor shall implement the project entirely in accordance with the ESIA mitigation measures detailed in the ESMP. It is required that before commencement of actual construction, the Contractor should submit a work site plan that complies with the national environmental guidelines and an ESMP for the different phases of the work. The environmental plan shall specify the location of sources of materials and disposal area of construction debris as well as other related matters. The plan shall take into consideration the mitigation measures proposed in this ESIA project report.

The Contractor shall have a Project Environmental, Health and Safety Site Officer (EHSSO), and Project Social Site Officer (SSO) who will be the Contractor's focal point for all environmental and social matters. The EHSSO and SSO will be routinely on-site for the duration of the construction works. Both officers will have minimum of Bachelor Degree in their respective specialization. The officers among others will be responsible for the following tasks:

i Drafting environmental and social aspects during project implementation;
ii Managing environmental, social, health and safety aspects at the worksites;
iii Participating in the definition of the no working-areas;
iv Recommending solutions for specific environmental and social problems;
v Facilitating the creation of a liaison group with the stakeholders at the project site and shall monitor the compliance of ESMP;
vi Organizing consultations at critical stages of the project with the stakeholders and interested parties;
vii He/She will be required to liaise with MUCE Safeguard specialists on the level of compliance with the ESMP achieved by the contractor regular for the duration of the contract;
viii Controlling and supervising the implementation of the ESMP;
ix Preparing environmental and social progress or "audits" reports on the implementation status of measures and management of site works.

3.7.2.4 The Consultant

The project Consultant will be responsible for design review and supervision of the construction phase of the proposed project. The Consultant shall ensure compliance of EIS and C-ESMP. The Consultant shall have a shall have a Project Environmental, Health and Safety Site Officer (EHSSO) and Project Social Site Officer (SSO) who will be the focal point for all environmental, health and safety and social matters. The EHSSO and SSO will be routinely supervised on-site for the duration of the construction works. Both officers will have minimum of Bachelor degree in their respective specialization.

3.8 World Bank Environmental and Social 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 comply with in the implementation of any project. These standards among others aim to

i. Support borrowers in achieving good international practice relating to environmental and social sustainability.
ii. Assist borrowers in fulfilling their national and international environmental and social obligations,
iii. Enhance non-discrimination, transparency, participation, accountability, and governance; and
iv. Enhance the sustainable development outcomes of projects through ongoing stakeholders' engagement.

Table 3.2 presents how the 10 Environmental and Social Standards (ESS) Standards of the World Bank are taken on board on ensuring that all HEET projects to be implemented at MUCE are environmentally and socially sensitive.

Table 3.2: World Bank Environmental and Social Standards

Environmental and Social Standards (ESS)	Objectives	Applicability	Requirements
ESS1: Assessment and Management of Environmental and Social Risks and Impacts	○ To identify, evaluate and manage the environment and social risks and impacts of the project in a manner consistent with the ESSs. ○ Enable screen and follow-up of remedies achieved through application of prevention, mitigation and compensation measures ○ Enable allocation of responsibilities and resources to implement required mitigation measures	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 at MUCE 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	○ To promote safety and health at work. ○ To promote the fair treatment, nondiscrimination and equal opportunity of project workers. ○ To protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with this ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate. ○ To prevent the use of all forms of forced labour and child labor.[1] ○ To support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law. ○ To provide project workers with accessible means to raise workplace concerns	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).

Environmental and Social Standards (ESS)	Objectives	Applicability	Requirements
ESS3: Resource Efficiency and Pollution Prevention and Management	○ To promote the sustainable use of resources, including energy, water and raw materials. ○ To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities. ○ To avoid or minimize project-related emissions of short and long-lived climate pollutants. [3] ○ To avoid or minimize generation of hazardous and non-hazardous waste. ○ To minimize and manage the risks and impacts associated with pesticide use.	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	○ To anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project life cycle from both routine and nonroutine circumstances. ○ To promote quality and safety, and considerations relating to climate change, in the design and construction of infrastructure, including dams. ○ To avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials. ○ To have in place effective measures to address emergency events.	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.

Environmental and Social Standards (ESS)	Objectives	Applicability	Requirements
ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	○ To avoid involuntary resettlement or, when unavoidable, minimize involuntary resettlement by exploring project design alternatives. ○ To improve living conditions of poor or vulnerable persons who are physically displaced, through provision of adequate housing, access to services and facilities, and security of tenure.[7]	NO	This ESS is not relevant to the project because the project is carried out within the Collage land.
ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	○ To protect and conserve biodiversity and habitats. ○ To apply the mitigation hierarchy[4] and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity. ○ To promote the sustainable management of living natural resources. ○ To support livelihoods of local communities, including Indigenous Peoples, and inclusive economic development, through the adoption of practices that integrate conservation needs and development priorities.	NO	The ESS6 is not applicable because the project sites are occupied by mainly grasses and few trees.
ESS7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities		NO	With this nature and location of project doesn't entail to have this category
ESS8: Cultural Heritage		YES	Applicable for the proposed project due to chance finds of physical cultural resources during excavation activities for new construction.

Environmental and Social Standards (ESS)	Objectives	Applicability	Requirements
ESS9: Financial Intermediaries (FIs)		NO	This ESS is not relevant to the project
ESS10: Stakeholders' Engagement and Information Disclosure	○ To establish a systematic approach to stakeholder engagement that will help Borrowers identify stakeholders and build and maintain a constructive relationship with them, in particular project affected parties. ○ To assess the level of stakeholder interest and support for the project and to enable stakeholders' views to be taken into account in project design and environmental and social performance. ○ To promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle on issues that could potentially affect them. ○ To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible, and appropriate manner and format. ○ To provide project-affected parties with accessible and inclusive means to raise issues and grievances, and allow Borrowers to respond to and manage such grievances	YES	The standard aims at making stakeholders part of the project through continuous sharing of information and updates. The standard call for stakeholder engagement throughout the project life cycle, and preparation and implementation of a Stakeholder Engagement Plan (SEP). It requires early identification of stakeholders, both project-affected parties and other interested parties, and clarification on how effective engagement takes place. Stakeholder engagement to be conducted in a manner proportionate to the nature, scale, risks and impacts of the project, and appropriate to stakeholders' interests.

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

The construction of proposed buildings at MUCE will involve clearance of some natural vegetation. This Environmental and Social Standard is applicable to this project due to its potential adverse environmental risks and impacts on site and in the areas of influence. These include impacts on natural environment such as air, water, land, human health and safety. Thus, MUCE shall analyse project activities and associated environmental and social risks and impacts during construction and operation 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. The asbestos materials will be disposed according to NEMC's guidance.

Based on the social relations between MUCE and the nearby community, the social services like playing grounds, churches, mosques, and accommodation facilities within and outside MUCE can be pressurized due to the increased students' enrolment. Thus, the current social services provision at MUCE needs to be rechecked to prevent pressure on local accommodation and rents.

3.8.2 Labour 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, including through contractors/subcontractors, and primary suppliers, to undertake various activities. To comply with the provisions of ESS2, MUCE 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.

MUCE 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 labour laws, including prohibiting child and forced labour, and combatting gender-based violence, in particular sexual harassment.

The Contractors/subcontractors, primary suppliers and sub-contractors shall ensure equal employment opportunity and not discriminate anyone based on colour, 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.

MUCE 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, MUCE projects will source construction materials from government authorized sources and water from IRUWASA throughout the project implementation. MUCE has a total area of 258 ha out of which 14506m^2 will used by the project. This implies ta the big portion of the MUCE is covered by green spaces and number of tons of CO_2 generated per year from main sources like cafeterias, vehicles will be sequestered by the available green spaces.

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

3.8.4 Community Health and Safety (ESS4)

The ESS4 requires beneficiary to avoid or minimize safety and health risks and impacts of the project, with particular attention to people who, because of their circumstances, may be vulnerable. Implementation of project components has the health and safety risks and impacts on project-affected communities. These risks and impacts could include increased rates of crime, and social conflict and violence, increases in traffic accidents, increased pressure on local accommodation and rents, increased transmission of HIV/STDS, as well as increases in gender-based violence.

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

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

In order to ensure safety during project implementation, MUCE 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 neighbouring 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)

The ESS8 is applicable for the proposed project due to chance finds of physical cultural resources during excavation activities for new construction.

3.8.6 Stakeholders' Engagement and Information Disclosure (ESS10)

Effective stakeholders' 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.

3.9. World Bank Group ESHS 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 be used 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

3.10 IFC Environmental, Health and Safety General Guidelines

The IFC Environmental, Health and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). The General EHS Guidelines contain a series of specific guidelines for different projects. They are designed to be used together with the relevant Industry Sector EHS Guidelines which provide guidance to users on EHS issues in specific 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.

When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent.
The specific guidelines applicable to this Project are the following:

- IFC General EHS Guidelines (2007)
- IFC EHS Guidelines for Construction Materials Extraction (2007)
- The Convention on Biological Diversity (CBD) (1992)
- The United Nations Framework Convention on Climate Change (1992)
- The Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, 1989

CHAPTER 4: ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS

4.1 Introduction

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

4.2 Physical Characteristics

4.2.1 Administration

Administratively, Iringa Municipality is one of the five districts of the Iringa region with 18 wards. MUCE, where the project will be implemented, is located in Mkwawa Ward, with 15 streets.

4.2.2 Climate

In Iringa, the wet season is warm and overcast and the dry season is comfortable, windy, and mostly clear. Over the course of the year, the temperature typically varies from 54°F to 80°F and is rarely below 50°F or above 83°. Generally, the project area at MUCE is a part of Southern Highlands of Tanzania, experiences long rainfall and short dry seasons with, more often, cool moderate winds. Total rainfall of the region ranges between 500mm and 1,600mm per annum with high geographical, seasonal, and annual variation. The rainy season is from November to May followed by dry and cold season from June to September.

The proposed establishment of new buildings at MUCE can potentially impact the climatic conditions of the surrounding area. The introduction of a new structure may lead to changes in the local microclimate due to alterations in land use, surface properties, and heat absorption. Factors such as increased impervious surfaces, changes in vegetation, and modifications to the natural landscape can influence temperature, precipitation patterns, and overall atmospheric conditions. Careful consideration and sustainable construction practices should be employed to mitigate adverse effects and maintain the ecological balance of the region.

4.2.1.1 Rainfall

Iringa Municipal Council experiences *extreme* seasonal variation in monthly rainfall and has only one rainy season, which is usually from December to May. Annual average rainfall is about 600mm. The seasonal rains range between December and May every year. The rains are usually reliable and favour the greenery of the University College (Source: Iringa Municipal Master Plan 2015 – 2035 and MUCE Master Plan 2019 - 2039).

Rainfall can significantly impact the proposed establishment of new buildings at MUCE. Excessive rainfall can lead to delays and challenges in construction activities, causing disruptions to the building process. Heavy rain can create muddy and unstable ground

conditions, making it difficult to excavate and lay foundations. Additionally, rainfall can affect the curing process of concrete and may hinder the progress of other critical construction tasks.

Also, construction activities themselves can have an impact on the rainfall pattern of the project area. Urbanization and the creation of impermeable surfaces, such as roads and buildings, can alter the natural drainage patterns, leading to increased runoff and potential flooding during heavy rainfall. Changes in land use and vegetation due to construction can also influence local microclimates, potentially affecting precipitation patterns in the long term. Therefore, the relationship between construction activities and rainfall is complex and requires careful consideration in planning and executing building projects at MUCE.

4.2.1.2 Temperature

Temperature in MUCE and Iringa Municipality in general is influenced by altitude that it is relatively low throughout the year. The warm season lasts for 2.1 months, from October 9 to December 12, with an average daily high temperature above 78°F. The hottest month of the year in Iringa is November, with an average high of 80°F and low of 60°F. The cool season lasts for 2.2 months, from June 10 to August 17, with an average daily high temperature below 73°F. The coldest month of the year in Iringa is July, with an average low of 54°F and high of 72°F.

The proposed establishment at MUCE is influenced by temperature conditions, which, in turn, are impacted by construction activities. Temperature plays a crucial role in construction, affecting material properties, curing processes, and worker productivity. In warmer temperatures, construction materials may cure too quickly, potentially compromising the quality of the final structure. While, cold temperatures can slow down curing and construction processes. The construction activities like the use of heavy machinery and equipment, can contribute to localized temperature changes in the project area. These alterations in temperature can impact the efficiency and effectiveness of construction, emphasizing the need for careful consideration and planning to ensure optimal construction conditions at MUCE.

4.2.1.3 Humidity

The perceived humidity level in Iringa, 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 1% of 1% throughout.

4.2.1.4 Wind

The average hourly wind speed in Iringa Municipal council experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 7.9 months, from April 9 to December 4, with average wind speeds of more than 9.2 miles per hour. The windiest month of the year in Iringa Municipal Council is September, with an average hourly wind speed of 12.6 miles per hour. The calmer time of year lasts for 4.1 months, from December 4 to April 9. The calmest month of the year in Iringa is February, with an average hourly wind speed of 5.7 miles per hour.

The proposed establishment of a new building at MUCE may be significantly influenced by the prevailing wind conditions in the project area. Wind can impact various aspects of construction, including safety, structural integrity, and overall project efficiency. Understanding wind patterns

is crucial for designing a building that can withstand local climatic conditions. Construction activities can affect the wind conditions of the project area. For instance, the installation of tall structures may alter local wind patterns, leading to potential changes in airflow and turbulence. Additionally, construction materials and equipment can contribute to dust and particulate matter in the air, affecting air quality.

To ensure a successful and sustainable of the proposed project, it is essential to conduct a thorough analysis of the wind conditions at the project site (Mkwawa ward). This includes considering factors such as prevailing wind direction, speed, and potential changes caused by the construction process. Implementing appropriate design measures and construction practices can help mitigate the impact of wind on the new building and ensure its long-term stability and functionality.

4.2.2 Soils and Geology

In Iringa region, two major superficial geological deposits are identified. These are the red or yellow, well drained, and highly weathered and the leached clay soils in the high-altitude areas. Intermediate clay soils which are characterized by being moderately drained and leached are found in the midlands while the lowlands are occupied by red brown loams which are highly fertile. Most of the farmlands are on sandy loams with some black cotton soils which characteristically host Acacia woodland.

Locally, loam, sandy loam, and alluvium sand make up the majority of the proposed project area at MUCE. The soils range from silt hardpan and iron crust ("mbuga") to red lateritic earth grey sand. The predominant soil types of the proposed site are clayey sand and light grey to dark red clay. During the rainy season, water moves sediments from the sloped area to the low land area, causing the rock to disintegrate owing to age and weathering. When these sediments are combined with agricultural residue and moved to a low-lying area, they break down into alluvium and mbuga (clay) soils, which are located close to the suggested site locations and have good to poor drainage.

The geological features of the site suggest that there are now water drainages designed to divert water away from the hill. But because of the amount of water, the overflowing drainage system damaged and washed out one side, which resulted in the structure's score.

4.2.3 Vegetation Cover

The campus is covered by natural and planted trees, graces and flowers. The former is more prominently in the undeveloped land that covers about 80% of the total land. This vegetation does not constrain further development of the University College. The latter is more prominent in the developed areas that were planted for beautification of the respective areas (Source: MUCE Master Plan 2019 - 2039).

The proposed establishment of a new building at MUCE is likely to impact the vegetation cover of the project area. The construction process may lead to the clearing of vegetation to make way for the building and related infrastructure. This can result in the removal of trees, plants, and other greenery, potentially affecting the local ecosystem and biodiversity. The extent of the

impact will depend on the size of the project and the mitigation measures implemented to minimize environmental consequences.

4.2.4 Hydrology

Iringa Municipality has several water bodies which cover 4.528 hectares of the total area. This coverage is equivalent to 0.14 percent of the total area. These bodies are Ruaha River, Kitwiru spring, Mawelewele water spring and seasonal streams within the town. Little Ruaha is the main source of domestic water in the municipality with support of Kitwiru and Mawelewele natural springs. Another seasonal stream is Hoho stream which starts in the Iringa Central area flowing towards Itamba area, this stream is formed by Kitasengwa stream, Mwangata stream and Itamba steam while Kitwiru stream, Kibwabwa stream and Kinegamgosi stream forms a tributary of little Ruaha river. Kihesa stream formed by Kleruu natural spring, Kisowele stream, Tumaini stream and Kigonzile stream which starts from Kleruu Teachers College towards Nduli. These streams are very important for economics activities of people because water from these streams is used for irrigation purposes (Source: IRUWASA Feasibility Study for Improvement of Water Supply and Sanitation Services in Iringa Municipality Project, 2022).As observed during the site visit in and around all areas proposed for project implementation there was no permanent rivers or seasonal stream that cut across the proposed project.

4.2.5 Topography and Drainage

The general topography of Iringa Municipal Council especially Mkwawa ward, according to MUCE Master Plan 2019 - 2039 consists of the low-lying land that is relatively homogeneous with gentle plains intersected by seasonal streams (Figure 4.1). Most of the Municipality land lies between 1,560 and 2,000 metres above sea level characterized by two main features. The first where MUCE is located is the central part of the town that is situated on the East – West escarpment, which forms the core of built-up area and the steep slopes to the east that fall into the Little Ruaha valley. The second feature is the hard rock hills scattered throughout the jurisdictional area but more noticeable at in Ipogolo, Kalenga, Wilolesi, Kihesa, Ugele, Mafifi, Isakalilo, Kitwiru and Mkimbizi areas. Thus, topography favours natural drainage system in the Municipality land surface, including MUCE.

The proposed establishment of buildings at MUCE is significantly influenced by the topography and drainage characteristics of the project area. The topography, which refers to the physical features of the land, plays a crucial role in determining the layout and foundation design of structures. Steep slopes, for example, may require special foundation techniques to ensure stability.

Additionally, drainage considerations are vital to prevent water accumulation and potential damage to structures. Proper drainage systems must be implemented to manage rainwater runoff and avoid waterlogging, which can compromise the integrity of the buildings and infrastructure. Therefore, a comprehensive understanding of the existing topography and drainage conditions is crucial in the planning and execution of construction projects. Proper management of construction activities, including erosion control and stormwater management measures, is essential to mitigate adverse effects on the natural features of the site and ensure the long-term sustainability of the built environment.

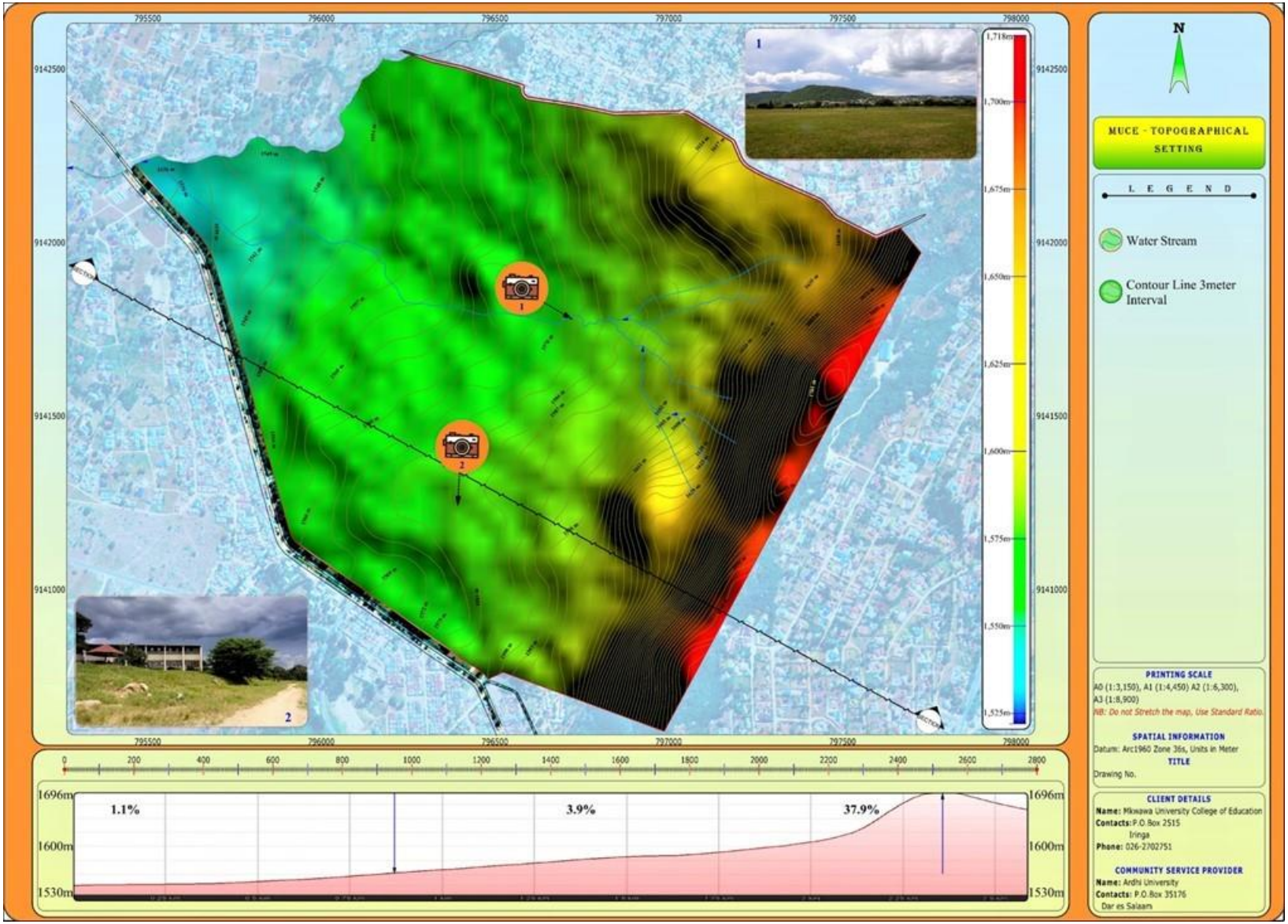


Figure 4.1: Topographic characteristic of MUCE (Source: MUCE Master Plan 2019-2039)

4.3 Baseline Measurements

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.

4.3.1 Ambient Air Quality

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 and calibrate certificate for instruments used during field measurement.

4.3.1.1 Ambient pollutant gases

Levels of ambient pollutant gases were measured using handheld gas analyser (Multi gas analyser C360), following the manufacturer's procedure and ISO 11042-1: 1996(E) protocol that meets the European standards (say EN 61779, EN 50104 and EN 45544). The measuring device undergoes automatic calibration once it switched ON by pumping in fresh air into the sensors to allow toxic sensors to be set to zero and the Oxygen sensor to be set to 20.9 %. The device established air composition characteristics by recording the proportions of Carbon dioxide (CO_2) [ppm], carbon monoxide (CO) [mg/nm^3], nitrogen oxides of nitrogen (NO, NO_2 and NOx) [mg/nm^3], Methane (CH_4) [mg/nm^3], Hydrogen sulphide (H_2S) [mg/nm^3], Hydrocarbons (HCs) [mg/nm^3], Ozone (O_3) [mg/nm^3], and sulphur dioxide (SO_2) [mg/nm^3] (Appendix 2a). The three reading were recorded at each point and the mean value used to represent the gaseous concentration at that point.

These measured parameters were then compared with TBS-NES limits and World Health Organization (WHO) guidelines to check their level of compliance. Due to unavailability of ambient H2S, TSP and HCs standards in local and/or international jurisdictions, their levels are not mentioned. Despite not being regulated by either local or international standards; the recorded levels for unlegislated CH4 have no significant affects to the environment and human health

Based on finding of ambient air quality below, 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.

4.3.1.2 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. The device has been tested according to the standard delivery schedule and complies with the EN 50081-1:1992 and EN 50081-2:1993 standards.

With a resolution of 0.001 mg/m^3 (1μg/m^3), the device is simultaneously capability of testing dust particles of different dimensions (microns of 10 and 2.5 and >10). On taking measurements, the device was placed at breath height of about 1.5 meter from the ground to monitor dust concentrations at each identified station. This position is assumed to be a relatively the breathing zone of the people at their respective locality or working environment. Seven diurnal periodic recordings were recorded at sites of the proposed project, and then the diurnal values used to calculate the mean 24-hours value of particulates for each station. Moreover, the recorded data were compared with prescribed available limit to check their compliance with both TBS-NES standards and WHO/IFC guidelines (Appendix 2b).

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. However, from the Appendix 2b it shown that the concentration of $PM_{2.5}$ is slightly higher than PM_{10} this is due to the fact that the diameter of $PM_{2.5}$ is too lower than the $PM_{10.}$ Moreover, looking the residential area during measurement, the PM_{10} and $PM_{2.5}$ it appears to be slightly higher due to several ongoing activities like rehabilitation of road, cultivation and influx of motor vehicle, cars etc. Therefore, despite of that situation all measured parameters are within the standard described by TBS and IFC/WB Group limits.

4.3.2 Noise and Vibration Environment

4.3.2.1 Noise levels

Noise data were recorded at the same stations used to measure ambient pollutant gases, dust, and one offsite point were recorded. At each station, noise levels were measured in accordance to ISO 1996-1:2003 using a digital sound level meter, with measurement range of 30 to 130dB (A). The device meets ANSI S1.4 type 2 standards and conforms to IEC 651 type 2, with a reading accuracy of ±1.5 dB (A). Prior testing, the device was calibrated using electrical calibration with built in oscillator (1 kHz sine wave).

The noise meter was set to the "A" weighed measurement scale, which enables the meter to respond in the same manner as the human ear. The "A" scale is applicable for workplace compliance testing, environmental measurement, and workplace design. On taking measurements, the device was held approximately 1.5m above the floor and at least 0.5m away from hard reflecting surfaces such as walls. Several readings were taken to grasp the mean diurnal noise values for each station. Average values were then calculated and compared with local and international standards.

Noise levels were measured for the purpose of establishing exposure of public and workers to the noise during construction and operations phase. In this case there were onsite and offsite measurements and results of both are described in Appendix 2c.

Based on findings, the average noise level indicates 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.

4.3.2.2 Ground Vibration

Data logger vibrometer was utilized to quantify the ground vibration at sampling location,

representing the onsite and offsite receptors. The device has an accuracy of ±5%, acceleration of 200 m/s^2, wide frequency ranges of 10 Hz to 1 kHz capable for capturing almost all possible vibration levels at working environment. The device was designed to measure vibration at the workplace according to European standard EN 14253:2003. At each identified station, diurnal readings were recorded, and their mean value was used to represent the vibration level at that particular station. On taking measurements, the accelerometer transducer was mounted on the ground to record both ambient and peak vibrations. To produce accurate results, the transducer was secured in direct contact with the ground. The levels of vibrations were recorded in terms of Peak Particle Velocity (PPV) in millimetres per second in the vertical direction to secure data associated with ongoing quarry activities.

Ground vibrations associated with construction activities were also measured at each location of the project area and the nearby community then were compared with Occupational Safety and Health (Working Environment) Regulations, 2016 limit of 5 mm/s PPV. All the location/stations were within the permissible limit of the regulation (Appendix 2d).

4.3.3 Water Quality Analysis

The aim of this is to ensure safety, sustainability, and effective management of this vital natural resource for both human and environmental well-being and understand the various physical, chemical, and biological characteristics of the water. This analysis helps in determining the suitability of the river water for different purposes and identifying any potential risks or contaminants present. However, water sampling for in-situ measurement and laboratory analysis were not conducted at MUCE due to the absence of any water sources nearby the proposed project area.

4.4 The Biological Environment

4.4.1 Flora and Fauna

The proposed area for project implementation has a variety of plants species including *Senna siamea* (Siamese cassia or Thai cassia), *Viscum album* (European mistletoe or common mistletoe), *Agave americana* (Century plant or Americana aloe), *Ficus religiosa* (Sacred fig/bodhi tree/Peepal tree), acacia trees, eucalyptus trees, *Terminalia mantaly* (Umbrella tree/Madagascar almond/Peacock tree), Mango trees, Mdodomya trees, together with short grasses. During general searches it was observed that there is no species of the amphibians and reptiles that are included in the IUCN Red list of threatened species.

4.4.1.1 Flora

The site lost its natural vegetation due to urban development. However, there is great deal of different trees have been planted around the MUCE campus, this has made the area to look unique and more aesthetic. During the field survey it was observed that there were several plant species that were observed, most of which were indigenous plant species. Some of the plants that were recorded are exotic tree species. All the matured tree species that will be affected by the construction activities will be replanted.

4.4.1.2 Fauna

The field survey revealed that there were no species around the proposed project area across various taxonomic categories.

4.4.2 Unique and Endangered species

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

4.5 Existing facilities and social issues at MUCE

4.5.1 Academic Buildings

The University possesses numerous teaching and supporting facilities spread throughout the campus to accommodate the growing number of enrolled students. The buildings on campus range from single to three floors, with the majority (95%) being single-storey or low-rise structures. Despite this, the University has successfully expanded its office spaces for academic and technical staff, lecture halls, library, laboratories, and workshops. Additional facilities, such as a cafeteria, dispensary, and sports ground, are also available. As a result, any future expansion plans for the University's enrolment should prioritize the expansion of essential facilities at MUCE.

4.5.2 Student Hostels

MUCE has a total of six halls of residence in the campus that have a capacity to accommodate 1,200 students. With existing enrolment of 6,000 students, only 29.8% of the students have accommodation in the campus while 70.2% of the total students are residing off-campus.

4.5.3 Staff Houses

MUCE provides accommodation for few academic and administrative staff. The University has a total of 23 staff houses that accommodates 30 families. Besides, academic staffs employed to-date are 212 of which more than 90% of them resides off-campus.

4.5.4 Gender issues at MUCE

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

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

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

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

4.5.5 Traffic Incidents and Accidents Management

MUCE faces a susceptibility to traffic incidents due to inadequate parking space for the current number of vehicles, leading to haphazard parking throughout the campus. Over the past three years, MUCE has witnessed a substantial rise in vehicular activity, evident from the accumulation of motor vehicles across various campus sections due to unregulated parking. To mitigate this, construction material transportation will occur during the night to minimize both traffic congestion and noise disturbances. Additionally, the forthcoming design will prioritize the provision of ample parking slots to address this concern.

4.5.6 Solid and Liquid waste Management

The University operates a system to handle both solid and liquid waste. Solid waste is overseen by the Iringa Municipal Council, with collection points conveniently placed across the campus. Liquid waste, or wastewater, is treated and channelled into the public sewer. The proposed establishment of buildings will strain the current treatment setup. Once finished, these buildings will rely on the existing wastewater treatment system at the Iringa Municipal Council, specifically utilizing the public sewer in the Mkwawa area.

4.6 Social Cultural Environment

4.6.1 Demographic profile

The proposed establishment of new buildings at MUCE is anticipated to have a substantial impact on the demographic profile of the surrounding areas, particularly in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council.

According to the 2022 Population and Housing Census report, the current population of Iringa Municipal Council stands at 202,490. The MUCE project is expected to contribute to an increase in the total population within and around the MUCE campus. In Mkwawa ward, which had a population of 15,320 in 2022 (with a gender distribution of 46.9% male and 53.1% female), Mtwivila ward with a population of 12,466 (47.4% male and 52.6% female), and Ilala ward with a population of 3,759 (47.9% male and 52.1% female), the demographic landscape is likely to experience changes with the implementation of the MUCE project.

As of 2020/20221, MUCE has a current student population of 5,827, and there are plans to increase this figure to 20,000 students over the next 15 years by 2039. This significant growth in student population is expected to lead to the employment of between 720 and 1,154 academic staff and between 348 and 579 administrative staff over the same period. The construction phase of the university is also likely to contribute to a temporary population increase due to the migration of contracted workers. Furthermore, upon completion of the project, the overall population in the university area is expected to continue growing as more students and workers join the community.

4.6.2 Cultural Heritage, Aspirations and Traditions

The dominant culture for the communities of Iringa Municipal Council including Mkwawa ward where MUCE is located is the Swahili culture. The main ethnic groups in terms of their numbers

are Hehe, Bena and Kinga groups. However, due to internal migration another ethnic group are found at Iringa Municipality which are Pangwa, Chagga, Nyakyusa and Ngoni. Regarding project site, the area is of mixed ethnic group due its admin student from around the corner of the country according to pass max and willing (Source: Iringa Master Plan 2015 – 2035 and MUCE Master Plan 2019 - 2039).

The project site itself reflects a diverse mix of ethnicities, as MUCE attracts students from various corners of the country. This diversity in the student population contributes to a rich cultural exchange and may influence the local cultural landscape. The establishment of a new building could impact the aspirations of both students and the local community by providing enhanced educational facilities, potentially opening up new opportunities for academic and cultural growth. However, it's crucial to ensure that the development respects and preserves the existing cultural heritage and traditions of the area. Balancing modernization with cultural sensitivity is essential for fostering a harmonious coexistence between the university and the diverse local communities.

4.7 Economic Activities

The proposed establishment of new buildings at MUCE is expected to have a notable impact on economic activities in the broader project area. The central area, which serves as the economic core for the town and region, is primarily characterized by a thriving commercial sector encompassing wholesale and retail businesses. The town centre, including Iringa, is also host to informal commercial activities such as petty trading, involving various small-scale enterprises like shoe making, drivers for motorcycle and taxi, food vendor tailoring, carpentry, and street vending.

With the introduction of the new building, there is likely to be a ripple effect on economic dynamics. The project is expected to generate economic opportunities, potentially leading to increased demand for goods and services. The commercial sector, being the predominant economic activity, may experience growth as a result of heightened economic activity associated with the new establishment. Additionally, the service sector, including petrol stations and garages, may also benefit from increased demand.

It is important to consider the potential positive impacts on local businesses and entrepreneurs, as well as the indirect benefits to the overall economic landscape of the town and region. However, it is also crucial to carefully manage any potential disruptions or challenges that may arise during the construction phase to ensure a balanced and sustainable economic development in the area. These activities may not have direct impact to the project, but they are provided herein below to give a general picture of the larger project area.

4.7.1 Agriculture

Agriculture serves as the primary livelihood for a substantial majority of households in Iringa Municipality, with approximately 82 percent of households engaged in agricultural activities, encompassing both crop production and livestock rearing. The fertile soil and favourable climatic conditions in the region support various agricultural endeavours, notably contributing significantly to employment and income generation, ensuring food security, reducing poverty, and fostering economic development.

However, the proposed establishment of new buildings at MUCE could potentially impact the local agricultural landscape. Factors such as changes in land use, accessibility, and the influx of new residents associated with the university expansion might influence the dynamics of agricultural practices in the area. Local farmers may need to adapt to these changes and find ways to sustain and optimize their agricultural activities amidst evolving circumstances.

4.7.2 Local Business

The proposed establishment of new buildings at MUCE is likely to have both positive and negative effects on local businesses in Mkwawa, Mtwivila, and Ilala wards at Iringa Municipal Council. Local businesses, such as restaurants, cafes, and grocery stores, may experience an increase in customers, particularly during the construction phase. Workers, students, and individuals associated with the project may contribute to higher foot traffic. Also, the demand for various goods and services, including construction materials, catering, and transportation, could create business opportunities for local entrepreneurs and service providers.

However, the construction phase may bring disruptions such as noise and dust, which could inconvenience local businesses and deter some customers. In addition to that, the influx of new students or residents associated with the expanded university facilities may alter the demographics of the area, impacting the preferences and needs of the local consumer base.

4.7.3 Tourism

Iringa Region cordially welcomes domestic and international tourists to view the unparalleled attractions in the region. Iringa Municipal Council offers several tourism attractions that draw visitor from around the world this include Ruaha National Park, Isimila Stone Age site, Kihansi fall, Kalenga Museum, Igereke stone painting, Kitulo Plateau National Park, Iringa Boma and Gangilonga stone. These tourism attractions in Municipality provide opportunities for wildlife fan, nature and cultural lovers to explore the regions natural and cultural heritage. (Source: Iringa Municipal Council, Five years Strategic Plan 2016/2017 to 2020/2021).

Also, the development associated with the new buildings may lead to improvements in local infrastructure, making the area more accessible and attractive to tourists in the long run, and there might be opportunities for educational tourism, where visitors are drawn to the academic and cultural offerings of MUCE.

4.7.4 Real Estate/Hotel/Lodge

The demand for housing at Mkwawa, Mtwivila, and Ilala wards, and other part within Iringa Municipal Council may rise during the construction phase, as workers and individuals associated with the project seek accommodation in the vicinity. This could lead to an increase in property values and rental prices nearby the proposed project area. Also, the growth in demand may attract real estate developers to invest in the area, leading to the construction of new residential properties to cater to the housing needs of the expanding population.

4.7.5 Natural Resources

The natural resources sector is comprised of various sub-sectors including forests, minerals(gemstones), water resources, landscapes and scenic beauty, agricultural land, fisheries,

renewable energy potential, wildlife, and biodiversity. The sector is very important through its contribution to the social and economic development of Municipality. Apart from economic gains, the sector also plays an important role in the maintenance of climate stability, conservation of water sources and soil fertility, controlling land erosion, and as a source of wood fuel, industrial materials, and non-wood products such as honey and bee-wax.

The establishment of new buildings at MUCE in Iringa Municipal Council has the potential to impact natural resources through land use changes, water consumption, waste generation, and increased energy demand. To mitigate these effects, careful planning, adherence to environmental regulations, and the implementation of sustainable practices are crucial. Additionally, community engagement and environmental impact assessments can help identify and address potential challenges, ensuring a balanced approach to development that considers both economic and environmental sustainability.

4.7.5 Industrial Development

Iringa Municipal Council has a booming economy, which depends on Industrial activities after Agriculture and Livestock keeping. Within Municipality there are several industrial developments contributing to economic growth and employment opportunities like Agro-processing, Mineral processing, construction materials, textile and garment manufacturing, manufacturing, and packaging, and small and medium industries this include dairy industries, food processing, craft and furniture's. (Source: Iringa Municipal Council, Five years Strategic Plan 2016/2017 to 2020/2021).

The proposed establishment at MUCE is likely to have a positive impact on industrial development in Iringa Municipal Council by creating economic opportunities, stimulating local demand, and fostering collaboration between educational institutions and industries. The indirect effects, such as infrastructure improvements and real estate development, further contribute to the overall growth and sustainability of the industrial sector in the region. These also, contribute to the local economy, create employment opportunities, income generation and provide a reliable supply of dairy products to meet the need of community. Therefore, Industrial developments in Iringa Municipal Council contribute to economic growth, job creation, and facilitate development of the region.

4.8 Economic Infrastructure

4.8.1 Roads and Parking lots at MUCE

The proposed establishment at MUCE can be accessed easily through Pawaga road, Mkwawa road, and Mtwivila road. All roads are tarmac road. Formal and paved parking areas are provided at the administration, lecture theatres and staff canteen premises. The rest of the buildings are served by informal parking areas that are not paved. Thus, based on the existing developments, the three areas designated for parking are not sufficient to meet the existing demand and thus, there are several informal and irregular parking areas within the campus (MUCE Master Plan 2019 - 2039).

Also, the proposed developments of buildings at MUCE have had a notable impact on the infrastructure, particularly on roads and parking lots. The expansion and development of new structures have likely led to changes in traffic flow and increased demand for parking space. This

growth necessitates careful planning and management to address potential challenges related to congestion, accessibility, and parking availability on the MUCE campus. Efforts to accommodate the increased demand for infrastructure should be implemented to ensure a smooth and organized environment for students, staff, and visitors.

4.8.2 Air Transport

Iringa Airport is located 13 kilometres (8.1 miles) north-east of the municipality. The airport has recently undergone (or is currently undergoing) some reconstruction to enhance the runway and expand passengers' lounge in response to increased passengers' demand, especially from international tourists visiting the famous Ruaha National Park. There is also a smaller airstrip within Ruaha National Park, which is still operational, serving smaller planes. Mafinga District Council has also an airstrip for small planes airstrip within Ruaha National Park.

4.8.3 Telecommunications Services

Iringa Municipal Council including Mkwawa, Mtwivila and Ilala area are well served with Internet connectivity, telephone services (both cellular and land line telephone services) and postal services. The Municipal is well served with several telephone companies, including Tanzania Telecommunication Company Limited (TTCL), Vodacom, Airtel, Tigo, Halotel and fibre network.

Fibre network contributes to improving connectivity, access to information, and enhanced communication capabilities business, institutions, and residents. Also, it plays essential role in driving digital transformation and support social economic development. Therefore, due to this the project area is well catered for by telecommunication networks receiving service from 4 privately-owned mobile service providers i.e., Vodacom, Airtel, Halotel, Tigo, fibre network and TTCL owned by public (Source: Iringa Municipal Council, Five years Strategic Plan 2016/2017 to 2020/2021).

4.8.4 Financial Institutions

In Iringa Municipal Council, several Financial Institutions are conducting business operations. Some of these are National Microfinance Bank (NMB), National Bank of Commerce (NBC), Tanzania Commercial Bank and CRDB Bank. The proposed establishment at MUCE has significant implications for financial services, particularly in the context of banking. Currently, CRDB Bank is the sole provider of banking services at MUCE, operating a branch on the campus that offers a comprehensive range of standard banking services. The construction activities may influence the financial landscape by potentially attracting additional banking institutions or impacting the accessibility and efficiency of financial services for the university community.

4.9 Social Services Infrastructure

4.9.1 Water Supply

In Iringa, IRUWASA is currently extracting water from three main water sources to serve the municipality. These sources are little Ruaha with a treatment plant at Ndiuka, Kitwiru spring and Nyamuhanga boreholes with an estimated combined yield of 27,300 m^3/day. (IRUWASA Feasibility Study for Improvement of Water Supply and Sanitation Services in Iringa Municipality project, 2022).

Water usage at MUCE correlates directly with population growth and various on-campus activities, such as domestic activities, maintaining gardens, operating the MUCE health centre, running cafeterias, engaging in construction projects, and performing cleaning duties. An upswing in water consumption signifies an uptick in demand within MUCE. The proposed development at MUCE is expected to have a significant impact on water demand at the campus. Currently, MUCE relies on water supplied by the Iringa Urban Water Supply and Sanitation Authority (IRUWASA), supplemented by additional sources such as boreholes. The construction of new buildings is likely to increase the overall water demand at MUCE, necessitating careful planning and coordination with water authorities to ensure a sustainable and adequate water supply for the expanded campus. It is crucial for MUCE to assess and address the potential challenges associated with the increased water demand to maintain a reliable and efficient water supply system. This could involve exploring alternatives such as stormwater harvesting, which has the potential to mitigate water expenses on campus.

4.9.2 Energy

Iringa Municipal Council uses various sources of energy for lighting, cooking as well as for industrial and other uses. These sources include reliable supply of electric power from the national grid, charcoal, firewood and others. MUCE consumes an average of 15 KVA of energy per year.

The Mkwawa area is provided with electrical power by the Tanzania Electricity Supply Company (TANESCO). Efforts are being made to gradually enhance the current infrastructure in order to accommodate the anticipated population growth. Nevertheless, due to frequent power disruptions, MUCE has acquired backup generator (diesel-fuelled generators) to supplement the insufficient power supply. This ensures that the MUCE operations continue without being disrupted by power outages. When feasible, alternative power sources such as solar energy and generators will be explored to guarantee a continuous power supply.

The proposed establishment of new buildings at MUCE is anticipated to impact the energy demand in the Mkwawa area. As the new buildings are constructed and operationalized, there will likely be an increased need for electrical power supplied by the Tanzania Electricity Supply Company (TANESCO). This surge in energy demand is a natural consequence of expanding infrastructure and facilities, and TANESCO will play a crucial role in meeting the electricity requirements of the growing campus

4.9.3 Security

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

Hence, the proposed establishment of new buildings at MUCE through HEET project should provide an opportunity to install a comprehensive surveillance system throughout the campus,

including CCTV cameras and monitoring stations, to enhance security monitoring and deter potential security threats. Also, should focus on implementing adequate and energy-efficient lighting solutions in and around the new buildings to create a safer campus environment during the night.

4.9.4 Education Services

- **Primary Education**

Iringa District Council has a major role of providing education including Pre- primary, Primary, Secondary, and also post primary level of schools. There are 145 government primary schools offering pre and primary education with a total of 4867 pupils' boys 66.6%and girls 72.6%. Iringa District Committed to provide equal and quality education to all school aged children. Despite of the effort made by the government and Council in general, there are some constraints encountered including shortage classrooms, teacher's houses, and desks. Some of the primary schools around the University are Ilala and Mtwivila Primary Schools as shown below.

- **Secondary Education**

Iringa District Council has Secondary schools which are community Based secondary school, Government Boarding Secondary school and non-Government secondary schools that includes some of the secondary schools like Mkwawa secondary school.

The proposed establishment at MUCE is poised to have a significant impact on the existing education services in the surrounding area, particularly affecting primary and secondary schools nearby. The proximity of the project to Mtwivila and Ilala Primary Schools, as well as Mkwawa Secondary School, raises concerns about potential disruptions to the learning environment.

Additionally, the proposed project may have ripple effects on other educational institutions within the municipality, including MUCE itself, Ruaha Catholic University (RUCU), University of Iringa (UoI), Moshi Cooperative University (MOCU), and Open University. These institutions may experience challenges related to infrastructure, traffic, and other logistical issues, impacting their daily operations and overall educational services.

Overall, careful consideration and planning are essential to mitigate potential disruptions and ensure the continued smooth functioning of the educational services provided by these institutions in the affected area.

4.9.5 Health services

The Municipality provides both curative and preventive health services. These services are provided by Government, Non-Government Organizations (NGOs) and Private sector. Currently, the Municipality has a total of 40 health facilities which most of them are skewed towards Gangilonga and Kitanzini wards. There are three (3) Hospitals, four (4) Health Centres and 24 Dispensaries as well as 9 Mobile Clinics. Also, there are 9 Pharmacies and one (1) Medical Stores Department (MSD) that facilitate the smooth provision of health instruments/drugs. Classification by ownership shows that, out of the total health facilities, 21 (52.5 percent) are owned by the public and 19 (47.5 percent) are privately owned. (Source: Iringa Municipal Council, Five Years Strategic Plan 2016/2017 to 2020/2021).

Also, within the project area there is MUCE Health Centre, founded by MUCE has the primary goal of delivering healthcare services to both the college community and the neighbouring population. This health centre is one of four such facilities in Iringa Municipal, officially registered with the number 116211. It serves a total population of approximately fifty thousand individuals, encompassing students, staff, and the surrounding community. Notably, the centre operates around the clock, providing services 24 hours a day. In order to archive that objective, emphasize should be on curing most common disease e.g., respiratory diseases, malaria and other disturbing disease and increase of hospital equipment.

Generally, the proposed establishment at MUCE is anticipated to impact the existing health services within the Municipal area. The expansion may lead to increased demand for healthcare services in the region, potentially affecting the capacity and resources of local health facilities. Specifically, the MUCE Health Centre within the project area may experience changes in patient volume and healthcare needs due to the influx of individuals associated with the new buildings. As a result, careful consideration and planning are essential to ensure that the existing health services can adequately accommodate the evolving demands arising from the development at MUCE

4.9.6 Religion

MUCE has no worshiping places within the college. Students use the worshiping centres around MUCE. The proposed establishment at MUCE may impact existing religious services and social issues in the vicinity, particularly for the Church and Masjid. The expansion could potentially affect the available space for religious activities, leading to considerations regarding the allocation of areas for worship. Additionally, social dynamics in the surrounding community may be influenced, necessitating careful planning to address any potential disruptions or concerns related to the coexistence of the university and religious institutions.

CHAPTER 5: STAKEHOLDERS' ENGAGEMENT PLAN

5.1 Introduction

This chapter gives an overview of the stakeholder engagement efforts conducted thus far including the process of identifying stakeholders. It highlights the stakeholders who have been identified and consulted, the methods used for consultation, and the concerns and issues raised by stakeholders regarding the construction activities of various facilities at MUCE and conclude with a review of how these issues have been addressed. The primary objective of stakeholder engagement is to outline how MUCE will involve stakeholders throughout the development of the proposed project.

The engagement activities associated with the Environmental and Social Impact Assessment (ESIA) offer 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 considered 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 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).

5.3 Objectives of Stakeholders' Engagement

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

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

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

5.4 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 within MUCE at Mkwawa ward. This process allowed the creation of a channel of communication for consultation from the local and national level. National and local authorities including leaders with in influence in the project have been involved in the process.

The consulted stakeholders are found at Regional, Municipal, District and local levels. At municipal levels consultant meet with Municipal Environment Management Officer, Town planning officer and community development officer. At the local level, MUCE (Staff, Students and Services providers), Mkwawa, Mtwivila and Ilala Ward Executive Officers (WEOs) were consulted. In addition, interview was held with the health and safety inspectors at Occupation Health and Safety Authority (OSHA), Fire and Rescue Force office, Iringa Water Supply and Sanitation Authority (IRUWASA), Rural Water Supply and Sanitation Authority (RUWASA), TANESCO, NGOs and CBOs.

5.5 Stakeholders Engagement 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 were utilized to generate initial awareness, encourage participation, and facilitate long-term information sharing. However, the selection of specific methods relied on the level and purpose of engagement, as well as the specific stakeholder group being targeted. In the ESIA process, the ESIA Consultants employed the following methods to engage the public.

5.5.1 Community Meetings

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

5.5.2 Formal Meetings

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

5.5.3 Focus Group Discussions

MUCE employed FGDs 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. FGDs were employed to explore issues that are relevant to specific groups or sub-groups of a community – such as youth, the elderly, women, students and people with disabilities (Plate 5.2). The intention of using this approach was centred upon establishing of similarities and differences among people of the same or different groups.

5.5.4 Site visits

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

5.5.5 Disclosure

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

Table 5.1: Summary of Stakeholders Communication methodology

S/N	Stakeholders Group	Language	Communication means
1	Government Institutions and Agencies (TCU, OSHA, TANESCO, IRUWASA, RUWASA, FIRE)	Kiswahili & English	○ Phone and Email ○ Meetings ○ Roundtable discussions
2	Local government (Iringa Municipal Council, Mkwawa, Mtwivila and Ilala ward)	Kiswahili	○ Community Meeting ○ Roundtable discussions
3	MUCE student and disabled people	Kiswahili & English	○ Roundtable discussions
4	MUCE Staff (Administrative and Academic staff, and Service provider)	Kiswahili & English	○ Phone and Email ○ Meetings ○ Roundtable discussions

S/N	Stakeholders Group	Language	Communication means
5	Vulnerable Groups (women, youth and elders)	Kiswahili	○ Community Meeting ○ Roundtable discussions
6	Others (NGOs, CBOs, and private sector etc.)	Kiswahili & English	○ Phone and Email ○ Meetings ○ Roundtable discussions

5.6 Stakeholders' Concerns

Generally, all consulted stakeholders consulted had no objections regarding the proposed project and appeared to be content with its objectives leading to its initiation. They all urged the proponent to abide by the relevant rules and regulations guiding her project operations. Issues raised by stakeholders were noted as explained on table 5.2 below.

Table 5.2: Details of Stakeholders concerns (Source: Consultation with stakeholders in April 2023)

Level	Institutions/ Organization	Views and Concerns of Stakeholders	Responses To Concerns
National Level	**Tanzania Commission of Universities (TCU)**	○ Building should be well designed to reduce and avoid environmental pollution like noise, air and vibration pollution. ○ The contractor should deploy dust suppression and mitigation measures such as regular sprinkling of water and scaffolding the site to minimize on dust pollution. ○ Building construction and their design should consider access for disabled people and their necessary facilities. ○ The proponent should take into account issues of waste management for both solid, liquid and hazardous waste. ○ Construction operations must be evaluated to ensure they do not disrupt the educational activities of the University. ○ Prior to commencing construction, it is essential to conduct a thorough examination and analysis of the soil	○ The design group will need to incorporate and revise all the addressing concerns in the drawings in order to enhance their functionality. ○ MUCE management shall cooperate with contractor to develop a plan that ensures that dust generated during construction activities are well managed. ○ The design group will need to revise the drawings in order to enhance their functionality. ○ MUCE treated wastewater into public sewer and ensure that all problems associated with waste water generation are solved well. Also, the solid waste generated are collected and managed by Iringa Municipal Council. dumpsite weekly ○ The soil suitability for the specific buildings must be assessed through a soil analysis as detailed in the Geotechnical report.
Regional Level	**OSHA**	○ The proponent should make sure the project is registered under the Workplace Information Management System (WIMS) before pre-construction and construction phases. ○ The project is impressive, emphasized on keeping first aid kit during the construction phase. ○ Contractor should have first aiders	○ MUCE should register the proposed establishment of new buildings at OSHA. ○ MUCE and contractor should 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	Institutions/ Organization	Views and Concerns of Stakeholders	Responses To Concerns
		representative. o Giving out health and safety awareness. o They should have health and safety personnel in place. o Conducting Health and Safety training and awareness programs. o The proponent should conduct Risk Assessment before construction and prepare a Risk Assessment report. o The proponent should prepare the Occupational Health and Safety Policy both in English and Swahili languages, and it should be displayed in an accessible place within a workplace. o The contractor should have a pre-medical and post-medical examination of their workers, o The site area should have a provision of changing room. o All workers should be provided with sufficient Personal Protective Equipment (PPEs) during all project phases	o MUCE and Contractor will ensure that first aid and trained first aiders are in place for the proposed project. o MUCE and contractor should explain the nature of the project to the surrounded community and people living within the project area. o Contractor should have registered HSE representatives. o Contractor should provide Induction training to workers on health and safety and the appreciation of safety gear will be done. o Risk assessment report is a part of ESIA report. o The contractor must follow this as a component of the safety and health strategy. o Medical check-ups for the new employee will be done and workers shall be tested their health as per OSHA regulations. o Contractor shall construct and design area for workers to change the clothes and other stuff during project implementation. o Personal Protective Equipment (PPE) must be supplied due to the inherent nature of construction tasks and the associated hazards.
	TANESCO	o It is a very good project that will help to increase enrolment for both girls and boys but also make easy for many young people to apply with their territory.	o The Contractor should adhere to details of the architect designs. o The design group will need to incorporate

Level	Institutions/ Organization	Views and Concerns of Stakeholders	Responses To Concerns
		○ Urged that fire alarms system should be built in for all building emergencies. ○ Also, the new buildings should have breast feeding area. ○ Emphasize on the design of the buildings they should consider elevators. ○ Lastly, they should keep complex networking electricity system.	and revise all the addressing concerns in the drawings in order to enhance their functionality.
	IRUWASA	○ IRUWASA will be able to supply sufficient water and water of good quality to meet the new water requirements of the university.	○ MUCE will enhance water availability for the project activities from IRUWASA.
	Fire and Rescue Force	○ Drawings should be submitted to fire office for approval before the commencement of the construction. ○ Fire drilling should be conducted at least twice a year. ○ Proponent must install the exit signs throughout the project site and a fire assembly point. ○ Proponent should engage a registered electrical engineer in monitoring the electric system of the buildings at the site. ○ Fire detections system must be provided. Its components such as smoke detectors, heat detectors, beam detectors, sounders, beacons, manual call points, control panel, alarms and others must be in acceptable standards. Installation should be done by recognized and qualified institution. ○ Adequate Portable Fire Extinguishers must be provided, installed properly and maintained in accordance with acceptable standards by authorized personnel during all phases of the proposed project.	○ The Contractor should adhere to details of the architect designs. ○ MUCE should adhere this in order to ensure compliance and avoid unnecessary incident or accident. ○ MUCE should award contractor with registered electrical engineers. ○ The design group will need to incorporate and revise all the addressing concerns in the drawings in order to enhance their functionality. ○ The design group will need to incorporate and revise all the addressing concerns in the drawings in order to enhance their functionality.

Level	Institutions/ Organization	Views and Concerns of Stakeholders	Responses To Concerns
Local Level	**Iringa Municipal Council** (DED, Environmental Management Officer, Town Planning Officer, Community Development Officer)	○ The project is very positive to bring development in the Iringa region in different aspects of education and gradual change of economic. ○ Pressed on giving out health education during the pre-construction period to the community and workers who will be on construction phase and student about HIV/AIDS. ○ The proponent should ensure proper management of generated solid waste. ○ Clearance should be done only on the proposed establishment areas to minimize cutting of trees and other vegetation. ○ Contractors should avoid child labour. ○ Youth around MUCE should get opportunity in the project phase. ○ Emphasized on tree restoration before demolition the current trees site area to maintain the ecosystem of the environment. ○ The contractor should employee skilled and unskilled labour to the community around. ○ Safety of workers and community should be considered during construction phase. ○ It is a nice project and gender balance will be observed during the construction phase. ○ The development will take place within the university Campus and the land already belongs to MUCE. ○ Before site clearance around the project area, they should get a permit in ministry of forest. ○ It insists on safety issues through prohibition of the emission of chemical and wastewater with chemicals	○ MUCE and Contractor should provide education to workers and surrounded community about communicable diseases like HIV/AIDs. ○ Good solid waste management policies will be adhered to which will guide all workers to protect the environment and only authorized hazardous and non-hazardous collection agencies shall be engaged. ○ The debris from demolition during decommission phase will either be transported by a licensed waste transporter for dumping at approved site or used as base material for new construction work. ○ Tree plantation should be initiated after design period in all area where clearance was done. ○ MUCE should make sure that the awarded contractor shall provide employment to persons living within Mkwawa ward and the neighbouring community. ○ Proponent should have a health and safety policy and implement it to reduce injury/accident at work. Also, all personnel will be provided with appropriate protective gear. ○ Employment should be provided with equal chance to all gender. ○ Contractor should find permit from responsible authority before site clearance.

Level	Institutions/ Organization	Views and Concerns of Stakeholders	Responses To Concerns
		from laboratory during operation phase of proposed project especially Physics lab and other existing lab at MUCE before discharging into public sewer.	○ MUCE should provide training to their workers on management of wastewater from laboratories before being discharge into the public sewer in order to enhance the efficiency of municipal wastewater stabilization pond (Public sewer).
	Ward Office – (Mkwawa, ward and the neighbouring community) (Ward Executive Officer, chairmen, Community Development Officer, Health and Environmental officer, community representative)	○ The project is worth being undertaken and accepted. ○ Project should provide employment opportunities to the local people. ○ Integrate the component of Corporate Social Responsibility (CSR) to the proposed projects. ○ Interaction of workers, students and the community can cause an increase in sexual conflicts and moral erosion. ○ The payments for labourers should be done timely and fairly. ○ The proponent should engage local community or leader in any meeting regarding the project. ○ The unskilled labour they should have contract of payment with the main contractor	○ MUCE should make sure that the awarded contractor shall provide employment to persons living within Mkwawa ward and the neighbouring community. ○ MUCE and Contractor should provide education to workers and surrounded community about social transmitted diseases like HIV/AIDs. ○ Contractor shall have official and transparent contracts for their labourers. ○ MUCE and Contractor shall engage local leaders in any meetings concerning the proposed establishment.
	Mkwawa University College of Education (MUCE) (Administrative and Academic staff)	○ It is a nice project and gender balance will be observed during the construction phase in providing job opportunities to people nearby MUCE. ○ Public health and safety should be incorporated in the project life cycle. ○ Focus on intensified MUCE, a security system should be in place prohibiting unauthorized people to access into the campus.	○ Proponent and contractor should have a health and safety policy and implement it to reduce injury/accident at work ○ During the construction phase, the proponent will ensure that the whole area is fenced and only workers and permitted visitors will have access to enter the proposed project premises.

Level	Institutions/ Organization	Views and Concerns of Stakeholders	Responses To Concerns
		○ Integrating Health and Safety issue within the life cycle of the proposed project. ○ Proper waste management plan should be in place. ○ Improvements of student's security due to availability of the proposed hostel building. ○ Through complying with economic justice, local food vendors (mama and baba lishe) should have access of doing business within the MUCE. ○ The proponent should ensure that the necessary laws and policies pertaining to environment and natural resources management are adhered when implementing the project. ○ The project should enhance students' safety and the safety of their assets as they will all be accommodated on the campus. ○ All waste generated during project implementation should be management properly to ensure environmental protection from pollution.	○ Security personnel from recognized security company will be employed to provide service for 24 hours during construction phase. ○ Lighting bulbs will be installed and used to produce sufficient light during night hours. ○ MUCE shall give access to all baba lishe and Mama lishe surrounded the project area to provide services to all interested workers within the project area. ○ MUCE and Contractor should comply to all policies and laws. ○ MUCE shall enhance health and Safety of students within the project area. ○ Temporary solid waste collection chamber shall be constructed within the project premises for best management of solid waste. ○ The debris from demolition will either be transported by a licensed waste transporter for dumping at approved site or used as base material for new construction work.
	Mkwawa University College of Education (MUCE) (MUCE Students,	○ The proposed physics lab and science building should have special discussion rooms. ○ The lecture rooms within the proposed projects should possess fixed chairs as an attempt of managing noise pollution. ○ The proposed lecture rooms should have proper audio-visual aids to enhance the learning process.	○ The Contractor should adhere to details of the architect designs. ○ The design group will need to incorporate and revise all the addressing concerns in the drawings in order to enhance their functionality. ○ MUCE should install and provide

Level	Institutions/ Organization	Views and Concerns of Stakeholders	Responses To Concerns
	DARUSO and Services providers)	○ The proposed project should have toilets for disabled people. ○ The proposed project should have alternative sources of water and energy (e.g., generators and Solar Pannel). ○ Most of university infrastructures are not friendly to people living with disability. ○ There must be enough chairs in rooms as per number of students. ○ Internet sources and cables should be included in the designing of the buildings both in classes and hostels. ○ The proposed project for hostel building should have enough water supply to avoid water scarcity and to ensure cleanness. ○ Noise and dust pollution during construction period should be minimized.	alternative water and energy within the University. ○ The design group will need to incorporate and revise all the addressing concerns in the drawings in order to enhance their functionality. ○ Workers will be provided with noise protective gear and insist on the use of it all the time. ○ Contractor will ensure that all working machines and trucks delivering construction materials are well inspected and serviced properly to reduce noise. ○ Site shall be fenced with well-approved material like iron sheets to reduce the speed of noise. ○ Layout of loading materials should be done to locate construction materials at the exact where dust emission will not affect the community. ○ Contractor/proponent will procure the ready to use concrete mix which will help to reduce dust emission from mixing materials. ○ For the case of present stockpiles, the proponent will cover all stockpiles during non-loading hours.

CHAPTER 6: IMPACTS ASSESSMENT, MITIGATION MEASURES AND PROJECT ALTERNATIVES

6.1 Introduction

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

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

Chapter eight details the suggested mitigation which MoEST through MUCE is dedicated to implement. 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) analysing 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.

6.2 Impact Identification

Impact identification will be done by analysing the project activities and determining their influence on the environmental and socio-economic baseline of the project area. The environmental characteristics of the project area will include biophysical (topography, soils, climate, rainfall, water resources, flora and fauna) and social characteristics (demography, settlement, land administration and tenure, economic activities, infrastructures and services, water supply and sanitation, healthy and HIV and AIDS). Identification of potential impacts and physical assessment of the following environmental components likely to be impacted will also conducted:

a) Physical /chemical.
b) Biological /ecological.
c) Social /cultural. and
d) Economic /operational.

Also, straightforward checklist that was integrated into a matrix of impacts matched with different project activities at different periods was employed in this ESIA study. The checklist offers a list of possible effects based on project activities at different stages, as well as the amount of time the area will need to recover. The impact's size, scope, and severity were ascertained using the matrix.

6.2.1 Nature of Impact

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

6.2.2 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.

6.3 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 analysing 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.

6.3.1 Severity/Benefit

The severity of impacts is determined by experts who use their professional judgment 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: Severity rating scale

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

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

6.3.2 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 Mkwawa, Mtwivila and Ilala ward within Iringa Municipal Council.
Regional	The impacts will be of such a nature that it may affect the Iringa Region.
National	The impacts will be of such a nature that it may affect the entire Tanzania.
International	The impact would affect resources and processes outside the borders of Tanzania.

6.3.3 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.

- **Phase-** During which phase of the construction is the impact likely to occur. The phases included Mobilization, Construction, Demobilization and Operation.
- **Reversibility of the impact-** Every impact was checked if its effect can be reversed or not. Letter R was used to denote reversible impacts while IR was used to denote Irreversible impacts.
- **Cumulative Impacts-** These are impacts that cause changes to the environment that are caused by an action in combination with other past, present and future human actions.
- **Residual Impacts-** These are lasting effects or consequences that remain after a project or activity has been completed

6.3.4 Criteria and Significance Rating

The significance of the impact, considering all the assessment criteria mentioned earlier, serve as an indication of its overall importance. The assessment of significance was conducted within the appropriate context, recognizing that an impact can be relevant to either the ecological environment, the social-economic environment. This can be achieved by ensuring that all ESIA team followed the mentioned objective criteria, subjectivity was minimized to the greatest extent possible. Nevertheless, it is important to acknowledge that there will always be an element of judgment 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).

Table 6.4: Significance of 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.

6.4 POTENTIAL IMPACTS DURING THE MOBILIZATION PHASE

A. POSITIVE SOCIAL IMPACTS

6.4.1 Job Creation and employment opportunities

During this phase, the impact on job creation and employment opportunities for local residents is notable. As planning and preparations take place, there is a surge in employment, benefiting the local community. Job opportunities in areas such as consultant for conducting ESIA study and for project design, project planning, site preparation, and initial logistics are likely to emerge, providing a positive economic boost to individuals in the vicinity. This preconstruction phase is expected to enhance the livelihoods of local residents, fostering economic growth and contributing to the overall well-being of the Mkwawa, Mtwivila and Ilala community.

The impact is expected to be high, primarily benefiting the local community in the immediate region of MUCE. However, it is important to note that this impact is likely to be temporary and associated specifically with the preconstruction phase. Once is complete, the direct employment opportunities may diminish, but the overall project could have lasting benefits for the region in terms of enhanced infrastructure and potential long-term socio-economic development.

Enhancement measures

- The contractor shall be encouraged to employ local, unemployed yet willing to work hard manpower to the extent viable subject to a maximum of 50% unskilled labour. This will ensure that local people are more benefited out of the project.

- 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 labour standards and regulations, providing a safe and supportive working environment for all employees
- Employment opportunities to be offered based on merits and known interviewing procedures and grading systems.
- Continuously monitor the impact of job creation initiatives, making adjustments as needed to address any challenges and maximize positive outcomes for the community.
- Reasonable wages should be paid to both skilled and unskilled labourer to be employed by the project.

6.4.2 Increased market opportunities and sources of income

The influx of construction-related activities, such as the procurement of materials and services, is likely to create a surge in demand for local goods and labour. Local businesses, ranging from suppliers of construction materials to food vendors, accommodation and transportation services, are expected to experience an increase in market opportunities. This, in turn, directly contributes to the income generation for individuals engaged in these economic activities within the immediate vicinity of Mkwawa, Mtwivila, and Ilala wards in Iringa Municipal Council. This impact is primarily direct, as it directly involves local residents in economic activities related to the project.

While the impact is direct and local, it should be noted that the positive effects may have a cumulative aspect. The continuous demand for goods and services could lead to the growth and expansion of local businesses, potentially establishing a foundation for sustained economic development in the medium to long term. However, the direct impact is most pronounced in the short term during this phase. The impact is reversible to some extent, as the economic opportunities may decrease after the mobilisation phase, but the skills and experiences gained by individuals could have longer-term effects, potentially leading to sustained local economic development.

Enhancement measures

- Encourage the project to prioritize the procurement of goods and services from local businesses. This can include construction materials, equipment, and various services required during the mobilization phase.
- Implement training programs to equip local residents with skills relevant to emerging market opportunities. This can include workshops on entrepreneurship, vocational training, and business management.
- Promote environmentally and socially sustainable business practices to ensure that the increased market opportunities contribute to long-term economic and community well-being
- Implement fair and transparent procurement processes to ensure that local suppliers have equal opportunities to participate. This can include clear guidelines, open bidding processes, and fair evaluation criteria

- Ensure monitoring of labour standards among contractors, sub-contractors, workers and service providers; and
- Qualified local vendors/ entrepreneurs should be given priorities to supply different goods and services to the project.
- Foster collaboration between the project management and local community organizations. This can help identify potential suppliers and service providers, creating mutually beneficial relationships that contribute to the economic development of the community

6.4.3 Increased Revenues to local authorities

The proposed establishment of the proposed establishment at MUCE, there is a potential for increased revenues to local authorities in Iringa Municipal Council. This impact is considered indirect, local, and likely to be of a short to medium-term nature. The influx of construction-related activities is expected to generate additional economic transactions, leading to increased local tax revenues for the respective Municipal Council. However, as the construction phase concludes, the impact may diminish, making it a relatively short to medium-term effect. The impact is reversible, as it is tied to the specific construction project and may subside once the project is completed.

Enhancement measures

- Encourage the utilization of local businesses for supplies and services needed during the construction phase. This promotes economic growth within the community.
- Local authorities can strategically plan and implement tax structures that ensure optimal revenue collection during the peak construction activities. This may involve revising tax rates on construction-related transactions and services
- Promote local economic development projects that align with the construction activities to sustain economic transactions beyond the construction phase.
- Encourage local businesses to provide goods and services required for the construction, fostering a symbiotic relationship.

B. NEGATIVE SOCIAL IMPACTS

6.4.4 Disruption of social activities

When supplies and construction equipment are being mobilized, truck movements along Pawaga Road and Mkwawa Road will disrupt people's daily routines. The groups most likely to be impacted by this movement are food vendors, passengers on public transportation, drivers of private vehicles, students at Ilala Primary School and Mkwawa Secondary School. However, it is likely to be a short-term disruption that can be mitigated once the construction phase is complete. Therefore, the impact is direct, local, short-term and reversible, and as construction concludes, normal social services are anticipated to resume without permanent consequences.

Mitigation measures

- Contractor shall develop and implement a comprehensive traffic management plan to minimize disruptions along Pawaga and Mkwawa roads. This plan should include designated routes for construction vehicles and scheduling deliveries during non-peak hours

- Contractor shall conduct awareness programs for the local community, including food vendors, passengers, drivers, and students, to inform them about the upcoming disruptions. Provide information on alternative routes and timing to minimize inconvenience
- Environmental and Social Specialists of MUCE should explore the possibility of temporarily relocating key services, such as food vendors or public transportation stops, to less affected areas during the mobilization phase. This can help maintain essential services without significant interruption
- Establish effective communication channels between the construction team and the local community to address concerns and provide real-time updates on construction activities. This fosters transparency and community engagement
- Coordinate with Ilala Primary School and Mkwawa Secondary School to adjust school schedules or routes, ensuring minimal disruption to students' daily routines. This could involve staggered start and end times or alternate transportation arrangements

6.4.5 Impact on Safety and Health risks

Workers and the general public will be exposed to a variety of health and safety hazards during the mobilization of resources and materials, including moving vehicles, noise, vibration, and accidents. During this phase, workers will be exposed to a variety of health and safety dangers, such as injuries from working tools and equipment and falling trees. Additionally, during the mobilization phase, failure to observe all health and safety regulations and misuse the safety equipment could result in worker fatalities or serious injuries. The potential hazards associated with mobilization activities, such as noise, dust, and temporary changes in traffic patterns, pose immediate risks to the safety and health of the local residents (Mkwawa, Mtwivila and Ilala wards). This impact is short-term in nature, as it primarily relates to the period leading up to the commencement of actual activities.

The impact is reversible in the sense that once the mobilization phase is completed, and necessary safety measures are put in place, the risks should diminish. Adequate safety protocols and precautions can be implemented to mitigate these concerns. However, ongoing monitoring and management will be crucial to ensure the well-being of the local population throughout the construction process.

Mitigation measures

- Implement comprehensive training programs for workers to raise awareness about potential hazards and safe work practices
- Enforce strict compliance with health and safety regulations to ensure the well-being of workers and the general public.
- Regularly monitor and audit the site to confirm adherence to safety protocols
- Mandate the use of appropriate PPE, such as helmets, gloves, and safety boots, to minimize the impact of potential accidents
- Develop and communicate clear traffic management plans to minimize disruptions and risks associated with changes in traffic patterns during mobilization.
- Implement temporary traffic control measures to ensure the safety of both workers and local residents.
- Install noise and dust control measures to mitigate the immediate risks posed to the safety and health of local residents.

- Regularly monitor environmental conditions to identify and address any emerging hazards promptly.
- Establish and communicate emergency response plans to address accidents or unforeseen incidents promptly.
- Ensure that workers are adequately trained on emergency procedures to enhance preparedness.

6.4.6 Increased Traffic and road accidents

The mobilization of building materials and equipment would result in increased traffic along Pawaga and Mkwawa roads due to the movement of automobiles and trucks. Since there are many users of the road, including private vehicles and public transportation, the inclusion of this activity will result in an increase in traffic intensity. Traffic congestion on the highways can lead to careless driving, which can cause automobile accidents.

The impact is primarily local and municipal in nature, affecting the immediate vicinity of the construction site and the corresponding wards within Iringa Municipal Council. It is expected to be a short-term effect, occurring during the preconstruction phase. The impact is expected to be high, reversible meaning that once the phase is completed, the increased traffic and road accidents are likely to diminish. However, effective traffic management and safety measures during the construction period can help mitigate the short-term consequences on local transportation.

Mitigation measures

- Contractor shall develop a comprehensive traffic management plan to regulate the flow of vehicles and minimize congestion during the mobilization phase.
- Contractor should coordinate and schedule deliveries of building materials and equipment during off-peak hours to reduce the impact on regular traffic.
- Implement reduced speed limits in construction zones and install clear signage to alert drivers about the presence of construction-related activities
- Conduct public awareness campaigns to inform local residents, businesses, and commuters about the upcoming construction activities and potential traffic disruptions.
- Work closely with local traffic authorities to monitor and manage traffic flow effectively, ensuring the safety of both construction personnel and the general public
- Encourage and facilitate alternative transportation methods for construction workers to reduce the number of individual vehicles on the road.
- Establish emergency response protocols to promptly address and manage any road accidents that may occur.

C. NEGATIVE ENVIRONMENTAL IMPACTS

6.4.7 Loss of flora and fauna due to exploitation of borrow pits/quarries and other natural resources

The extraction of building materials will have an effect that can be felt, such as the depletion of locally available building materials including sand, gravel, cobblestones, fill materials, and stones/aggregates. This is improbable, though, because there aren't many materials needed, and there are legitimate sources for building supplies. Additionally, there will be a growing need for water and energy use, but these demands will be minimal given the project's magnitude and

duration. The impact is expected to be high, primarily local and municipal in scope, as it directly affects the immediate vicinity and the broader municipal area where the construction project is taking place. In terms of the timeline, the impact is short term during the preconstruction phase, as it involves activities leading up to the actual building phase.

The nature of the impact on natural resources is generally reversible, given that the preconstruction activities are temporary and can be mitigated through proper environmental management practices. However, it is crucial for comprehensive environmental impact assessments and sustainable practices to be employed to ensure that any temporary disruption is minimized, and the natural environment can recover effectively after the construction project is completed.

Mitigation measures

- Implement efficient resource management practices to minimize the extraction of building materials.
- Ensure that building materials are sourced from legitimate and sustainable suppliers to prevent unauthorized exploitation of natural resources
- Monitor and control water and energy use to minimize additional demands on these resources.
- Explore alternative sources for building supplies to reduce the impact on local flora and fauna
- Raise awareness among local communities about the importance of preserving natural resources and involve them in conservation efforts.
- Ensure strict adherence to environmental regulations and guidelines to prevent overexploitation and degradation of natural resources

6.4.8 Contamination and /impaired quality of receiving body – land and water

During the mobilization phase of the proposed establishment at MUCE in Mkwawa ward, there is a potential environmental impact in the form of contamination and impaired quality of the receiving body, including land and water. The primary sources of construction waste, such as cleared vegetation, topsoil, and domestic waste from quarries, pose a risk of contaminating local surface and ground water resources. The impact is considered indirect, as it results from construction activities but is not the primary objective. It is also local, affecting the immediate surroundings of the project site including Mtwivila and Ilala wards.

The impact is likely to be both short-term and medium-term, occurring during the preconstruction phase. However, depending on the effectiveness of mitigation measures, the environmental consequences may persist in the long term or become permanent. Also, the extent of reversibility is contingent on the implementation of effective waste management and mitigation strategies. If proper measures are adopted, the impact may be reversible to some degree; otherwise, it could lead to irreversible damage to the local environment.

Mitigation measures

- Contractor shall develop and implement a comprehensive waste management plan to properly handle and dispose of construction waste, including cleared vegetation, topsoil, and domestic waste.

- Introduction of waste disposal bins, warning notices, posted at strategic points.
- No, on site burial or open burning of solid waste shall be permitted.
- Wastes not suitable for incinerations and general municipal waste dumping (e.g., plastics, rubbers, tyres, etc.) shall be removed for recycling, treatment, and/or disposal by licensed contractor as appropriate; and
- Instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste during bidding process.

6.4.9 Increased Air pollution and climate change

The mobilization -related activities, including site formation, material transportation, and tree cutting, are expected to release pollutants such as CO2, NOx, and fine particulates. These emissions, primarily from diesel-powered trucks and the removal of vegetation, could have environmental repercussions, leading to global warming and potential health issues. The impact is considered indirect, as it arises from the construction activities. It is a local impact, affecting the immediate areas of Mkwawa, Mtwivila, and Ilala wards. The consequences are likely to be both short term and long term, with potential permanence in terms of climate change effects. The impact is generally irreversible, especially concerning the long-term consequences of climate change and the alteration of local ecosystems.

Mitigation measures

- Implement the use of cleaner fuels and advanced technologies for construction machinery and transportation to reduce emissions of CO2, NOx, and fine particulates
- Prioritize the preservation of existing vegetation and implement a comprehensive tree planting program to offset the loss of trees during construction
- Install and enforce effective emission control devices on diesel-powered trucks to minimize the release of pollutants into the air.
- Optimize construction site management practices to minimize the duration and intensity of activities that contribute to air pollution, such as efficient scheduling and material storage
- Conduct awareness campaigns for the local community and workers regarding the environmental impact of air pollution and climate change, promoting sustainable practices
- Establish a comprehensive monitoring system to regularly assess air quality and emissions during construction. Report findings to relevant authorities and the community

6.5 POTENTIAL IMPACT DURING CONSTRUCTION PHASE

A. POSITIVE SOCIAL IMPACTS

6.5.1 Jobs creation and Employment opportunities

During this phase, about 150 people shall be employed by the contractor to do construction works such as construction of campsites, quarrying and material extraction and transportation activities etc. This shall increase the income to all those who can be employed by the contractor. During this phase, it is expected that the project will engage a qualified contractor(s) who will employ both skilled (30 people) and non-skilled labourers (120 people) from Mkwawa, Mtwivila and Ilala wards for establishment of the proposed buildings at MUCE. In additional to that, there will be an increase of self-employment due to the higher demands and supply of various goods and services for people working in the project. For example, an increase in restaurants, Food vendor (*Mama Ntilie*) will be obvious to meet the increased number of the people working at this phase.

Also, as the construction and development activities progress, there will likely be a surge in local employment providing residents with new job prospects. This infusion of employment opportunities is expected to contribute to the overall socio-economic development of the community, fostering a more vibrant and economically resilient local environment. This impact is high, regional and will be long term.

Enhancement measures

- Ensure that the contractor prioritizes the hiring of local residents, both skilled and non-skilled, from Mkwawa, Mtwivila, and Ilala wards.
- Collaborate with local employment agencies to identify qualified candidates within the community.
- Implement training programs to enhance the skills of the local workforce, enabling them to qualify for skilled positions and fostering long-term employability
- Establish contractual agreements with the contractor to adhere to the employment targets, ensuring the stipulated number of skilled and non-skilled labourers are hired from the local community
- Facilitate the growth of self-employment opportunities by encouraging the establishment of businesses such as restaurants and food vendors to meet the increased demand generated by the project
- Encourage the contractor to contribute to community economic development initiatives, such as supporting local businesses and entrepreneurs, thereby fostering long-term economic resilience
- Implement a monitoring and reporting system to track the employment impact throughout the construction phase, ensuring compliance with the outlined measures

6.5.2 Increase income to local suppliers and service providers

The construction phase of the proposed establishment at MUCE is expected to result in a significant increase in income for local suppliers and service providers in Mkwawa, Mtwivila, and Ilala wards. The project's substantial need for construction materials and services creates a positive impact on the local economy. Local suppliers of building materials and providers of food and waste collection services in Iringa are poised to benefit from the heightened demand, ensuring increased income opportunities. This impact is considered direct, as it directly affects the businesses and individuals involved.

It is also local and regional, as it specifically targets suppliers and service providers in the project region. The impact is anticipated to be long-term, providing sustained economic benefits to the local and regional community. Furthermore, the impact is reversible, as it is tied to the construction phase of the project.

Enhancement measures

- Contractor shall purchase raw materials from as many local suppliers.
- Contractor shall hire local workers for various construction-related tasks, contributing to increased employment opportunities in Mkwawa, Mtwivila, and Ilala wards.
- Provide training and support to local suppliers and service providers to enhance their capacity to meet the increased demand

- Actively involve and engage local suppliers for construction materials needed during the establishment phase.
- Provide training and support to local suppliers and service providers to enhance their capacity to meet the increased demand
- Implement fair and transparent procurement processes to ensure that local suppliers have equal opportunities to participate in supplying materials and services for the project
- Integrate environmentally sustainable practices in construction to minimize negative impacts on the local environment, ensuring long-term benefits for the community.
- Maintain open and transparent communication with local suppliers and service providers to address any concerns and ensure that they are well-informed about project developments

6.5.3 Increased skills and impart knowledge to local communities

During this phase, the proposed establishment at MUCE, there will be an impact on the local communities in Mkwawa, Mtwivila, and Ilala wards. This impact involves increased skills and knowledge transfer to the local workforce. Both skilled and non-skilled labourers will have opportunities for training and practical learning, particularly in the roles of technicians and machine operators. This initiative aims to equip the local workforce with essential skills, as they engage with new equipment and technologies introduced during the construction process.

The impact is indirect, as it results from the construction activities, and it is local, benefiting the specific wards mentioned. It is expected to be a cumulative impact over the short, medium, and long term, contributing to the continuous development of local expertise. The impact is reversible in the sense that it depends on the ongoing construction activities, but the acquired skills and knowledge are likely to have a lasting effect on the individuals involved.

Enhancement measures

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

B. POTENTIAL NEGATIVE SOCIAL IMPACTS

6.5.4 Influx of people

During the construction phase, there will be an influx of people seeking employment opportunities related to skilled, semi-skilled, and unskilled labour. While the preference is for

hiring from local communities like Mkwawa, Mtwivila, and Ilala wards, it is anticipated that individuals from outside these areas may migrate in search of employment. This influx may lead to high competition for job opportunities, negatively impacting the local residents. This impact is considered regional, as it extends beyond the immediate vicinity, and it is deemed negative, short-term, and of major significance. Additionally, the impact is indirect, as it arises from the construction activities but is not the primary focus of the project. It is also reversible once the construction phase concludes, and the labour demand decreases.

Mitigation measures

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

6.5.5 Food Insecurity and inflation of prices on other social services

The influx of workers during the selection and design stage is expected to create pressure on existing food sources, leading to shortages. Both community members and street councils predict that the project's development will attract a significant population seeking income-generating opportunities, thereby increasing the demand for goods and services, particularly food. This surge in demand is likely to result in chaos and inflation of prices on various essential services, including food. The impact can be categorized as indirect, cumulative, short term and reversible (once the construction phase is completed, the influx of workers is likely to decrease, alleviating pressure on food sources and stabilizing prices).

Mitigation measures

- Develop a comprehensive plan in collaboration with local communities to ensure sustainable food sources during the construction phase.
- Strengthen local supply chains for food by working with local farmers and vendors to meet the increased demand.
- Implement mechanisms to monitor and control the prices of essential goods, especially food items.
- Conduct awareness campaigns to educate the community about the potential impacts on food prices and steps being taken to mitigate the situation
- Ensure efficient construction management to complete the project within the stipulated timeframe, minimizing the duration of increased demand for resources

6.5.6 Occupational Safety and Health impacts

The proposed project at MUCE will have Occupational Safety and Health impacts. Despite worker training and adherence to safety measures, daily construction work poses significant risks, including accidents related to scaffold failures, electrocutions, falls, defective machinery, and exposure to harmful materials. These accidents can result in serious injuries or fatalities. Additionally, workers on-site may experience air pollution throughout the construction period. The impact is considered moderate, localized, and short-term. It is direct, as it directly affects the construction workers involved.

The impact is local, as it primarily affects the immediate vicinity of the construction site. It is short-term, as it is expected to occur during the construction phase. The impact is reversible with proper safety measures and inspections in place.

Mitigation measures

- Contractor should implement comprehensive and ongoing training programs for construction workers to increase awareness of potential hazards and safe work practices.
- Contractor should have registered health and safety pers
- Strictly enforce and monitor adherence to safety protocols and guidelines throughout the construction process, with a focus on preventing accidents related to scaffold failures, electrocutions, falls, defective machinery, and exposure to harmful materials
- Conduct regular inspections of construction equipment, machinery, and scaffolding to ensure they meet safety standards and are in good working condition
- Implement measures to control air pollution on-site, such as the use of dust control systems, proper waste disposal, and the restriction of harmful emissions from construction activities
- Mandate the use of appropriate PPE, including helmets, safety harnesses, gloves, and masks, to minimize the risk of injuries and exposure to pollutants
- Establish health monitoring programs for construction workers to detect and address potential health issues arising from prolonged exposure to construction-related pollutants
- Engage with the local community to raise awareness of the construction activities, potential risks, and safety measures in place, fostering a collaborative approach to safety
- Contractor shall ensure that the construction site is barricaded and hygienically kept with adequate provision of facilities including waste disposal receptacles, firefighting and clean and safe water supply;
- Foster a safety-first culture within the construction project by promoting a collective responsibility for safety among all stakeholders, including workers, contractors, and project management.
- A well-stocked First Aid kit (administered by medical personnel/First Aider) shall be maintained at 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;

6.5.7 Community Health, Safety and Security impacts

During this phase, is anticipated to have a significant impact on Community Health, Safety, and Security. Due to the influx of skilled and non-skilled workers, including imported skilled construction workers residing in labour camps, there is a likelihood of negative consequences for the local communities. The increased concentration of residents near construction sites may

result in uncontrolled movement of workers, posing challenges in identifying strangers and potential security threats. The potential for the spread of communicable diseases, such as COVID-19 and HIV/AIDS, is heightened with the entry of a temporary labour force into the community.

Moreover, the construction activities may lead to various social issues, including increased local prices, crime, prostitution, and alcohol abuse. The rise in traffic volume related to construction activities may contribute to higher road accident risks, especially on local roads used by trucks and construction equipment. The project's location within a university campus introduces additional complexities, such as an inherent increased risk of sexually transmitted diseases due to heightened social interactions between construction workers and local communities. The sources of harmful effects to the public are identified in Table 6.4. This impact is localized, moderate, and will be long term. Also, some aspects of the impact may be reversible, such as the potential decrease in traffic and social issues after the completion of the construction project. However, certain health impacts, once realized, may have long-lasting effects.

Table 6.4: Source of the harmful effects on health and community safety

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

Mitigation measures

- Implement strict access control measures at construction sites and labour camps to regulate the movement of workers and identify potential security threats.
- Collaborate with local law enforcement to enhance security in the surrounding areas during construction.
- Develop and enforce comprehensive health and safety protocols, including regular health screenings for workers, to mitigate the risk of communicable diseases like COVID-19 and HIV/AIDS.
- Provide training programs for workers on health and safety practices to minimize the spread of diseases.
- Establish community engagement programs to address concerns related to increased local prices, crime, prostitution, and alcohol abuse. These programs can include awareness campaigns, counselling services, and community forums.
- Implement traffic management plans to minimize road accident risks associated with increased construction-related traffic. This includes regulating the movement of trucks and construction equipment and providing proper signage.
- Designate specific areas for construction activities within the university campus to minimize social interactions between construction workers and the local community.
- Collaborate with healthcare providers to establish health clinics within the university to address potential health issues arising from increased social interactions.

- Regularly monitor and assess the impact of construction activities on community health, safety, and security.
- Adapt mitigation measures based on ongoing assessments to address emerging issues and concerns

6.5.8 Conflicts and grievances

These issues could stem from construction workers interacting with married women and school children, as well as construction-related concerns like dust and flying stones. The conflicts are likely to manifest between construction workers and the local community. The absence of proper channels to address grievances from various stakeholders may lead to delays in project activities, potentially increasing project costs. This impact is considered local, direct, negative, short-term, reversible and of minor significance.

Mitigation measures

- Conduct workshops and awareness programs for construction workers on cultural norms and local sensitivities, emphasizing respectful behaviour towards married women and school children.
- The project will prepare a GBV Action Plan that ensures project awareness raising strategy (for workers and community members), a list of GBV service Providers to which GBV survivors will be referred, revisions to the GRM to ensure it can address GBV complaints, and information on GBV allegation procedures in the workplace.
- Implement a structured Grievance Redress Mechanism that allows local community members to express concerns related to construction activities. This mechanism should ensure prompt and fair resolution of issues
- Implement effective dust control measures, such as water spraying and covering construction materials, to minimize the impact on the local environment and address concerns about dust and flying stones
- Organize regular meetings between construction project representatives and the local community to discuss ongoing activities, address concerns, and foster open communication
- Appoint a dedicated community liaison officer who serves as a point of contact between the construction team and the local community, facilitating communication and addressing grievances promptly
- Ensure timely and transparent communication about the construction schedule, potential disruptions, and any necessary adjustments to minimize surprises and conflicts
- Implement regular monitoring of construction activities to ensure adherence to guidelines and regulations, with penalties for non-compliance, thereby promoting responsible conduct among construction workers.

6.5.9 Gender Discrimination

Gender discrimination during the construction phase of the proposed establishment at MUCE primarily affects local women and girls in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council. The impact includes reduced employment opportunities, increased risk of sexual harassment, and potential psychological harm. This discrimination may lead to long-term consequences such as early pregnancies, school dropouts, and the spread of sexually transmitted diseases among affected individuals. The impact is considered direct, long-term, local, and potentially irreversible.

Mitigation measures

- Implement policies to ensure equal employment opportunities for both men and women in the construction workforce.
- Provide training and awareness programs to promote gender equality among contractors and workers.
- Establish and enforce strict anti-sexual harassment policies on construction sites.
- Display clear and visible posters on reporting channels at the respective construction offices.
- Develop a Sexual Harassment Policy before start of the construction and its contents distributed and disseminated to all workers
- Conduct regular workshops and training sessions to educate workers about appropriate behaviour and reporting mechanisms
- Engage with the local community, particularly women and girls, to understand their needs and concerns.
- Implement programs that empower women through skill development, education, and entrepreneurship opportunities
- Provide access to psychological support services for individuals affected by gender discrimination, including counselling and mental health resources.
- Collaborate with local organizations to address the psychological impact on women and girls in the community
- Provide access to psychological support services for individuals affected by gender discrimination, including counselling and mental health resources.
- Collaborate with local organizations to address the psychological impact on women and girls in the community
- Provide access to psychological support services for individuals affected by gender discrimination, including counselling and mental health resources.
- Collaborate with local organizations to address the psychological impact on women and girls in the community
- Partner with local non-governmental organizations (NGOs) and advocacy groups that focus on gender equality to leverage expertise and resources

6.5.10 Prevalence of Communicable diseases

Increase in HIV/AIDS prevalence and other communicable diseases are the concern for these construction activities due to interaction among construction workers and locals at Mkwawa, Mtwivila and Ilala wards. Workers tend to be tempted to engage in sexual relationships with women and young girls in the project area. In addition, prostitutes may be attracted to the area due to the presence of workers who are usually perceived to have a lot of money. The construction Phase is therefore likely to increase the risk of STDs including HIV/AIDS to both workers and the communities. The impact is direct, short-term, and local, with the potential for irreversible consequences on the health of both workers and the affected communities.

Mitigation measures

- Implement comprehensive health education programs targeting construction workers, students and local communities. These programs should focus on raising awareness about the risks of engaging in unprotected sexual activities and promote safe practices

- Provide easy access to free or affordable condoms on the construction site and within the local communities to encourage safe sexual practices and reduce the risk of STDs, including HIV/AIDS.
- Establish regular health screening programs for construction workers to detect and address any potential communicable diseases early. This can include HIV testing, counseling, and access to medical care.
- Foster community involvement in promoting health awareness and responsible behavior. Engage community leaders to support initiatives that discourage risky behaviors and emphasize the importance of health in the long term.
- Implement campaigns to reduce the stigma associated with HIV/AIDS and other communicable diseases. This can help create a supportive environment for affected individuals to seek testing and treatment without fear of discrimination.
- Increase security measures to discourage the influx of sex workers to the construction area. This may involve collaboration with local law enforcement to maintain a safe and secure environment.

6.5.11 Insecurity and theft

The proposed establishment at MUCE is anticipated to have a direct and short-term impact on the local communities of Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council. The increased level of crimes, particularly theft of project materials and equipment, poses a threat during the construction phase. The potential consequences include compromised work quality, project delays, and an increase in project costs. This impact is considered reversible, as security measures can be implemented to mitigate the risks.

Mitigation measures

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

6.5.12 Child labour

During the construction phase of the proposed establishment of new buildings at MUCE, there is a minor, localized, and short-term risk of child labour involvement in project-related activities. The impact is direct, short-term, and localized, specifically affecting persons living in Mkwawa, Mtwivila, and Ilala ward within Iringa Municipal Council. There is a risk of employing children in project activities, potentially depriving them of their childhood in ways that are mentally,

physically, socially, or morally harmful. The impact is reversible with the implementation of a Labour Management Plan (LMP) to ensure that no one under the age of 18 is employed or engaged in connection with the project.

Mitigation measures

- Establish and enforce a comprehensive Labour Management Plan that explicitly prohibits the employment or engagement of individuals under the age of 18 in any project-related activities.
- Conduct regular and thorough monitoring and audits to ensure compliance with the Labor Management Plan, with a specific focus on preventing child labour.
- Implement awareness programs within the local communities, emphasizing the importance of preventing child labour and encouraging community members to report any instances.
- Provide training for project personnel on identifying and addressing child labour issues, emphasizing the legal and ethical considerations associated with child labour
- Collaborate with local authorities to strengthen regulatory oversight and ensure that child labour laws and regulations are strictly enforced.
- Implement social support programs to address the socio-economic factors that may contribute to child labour, providing alternative opportunities for families and ensuring access to education for children.
- Establish a transparent reporting mechanism for workers and community members to report any suspected cases of child labour without fear of retaliation.
- Include clauses in contracts with suppliers and contractors, requiring them to adhere to the prohibition of child labour and verifying their compliance through regular assessments.

A. NEGATIVE ENVIRONMENTAL IMPACTS

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

6.5.13 Impairment of air quality due to dust and ambient pollutant gases imission

The proposed establishment at MUCE is expected to impair air quality in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council. Measurements indicate concentrations of PM2.5 and PM10 within WHO and Tanzania Emission Limits, but during construction, fugitive dust from activities like vegetation clearance may temporarily worsen air quality. This could affect workers and areas where sand and aggregates are collected, posing a health hazard and nuisances to the public and fauna. The impact is direct, short-term, local, and potentially reversible with appropriate mitigation measures.

Mitigation measures

- Implement effective dust suppression techniques, such as using water sprays or dust suppressants on construction sites to minimize the release of fugitive dust.
- Prioritize the preservation of existing vegetation during construction to reduce the need for extensive clearance, minimizing the disturbance that contributes to dust emission.
- Cover sand and aggregate stockpiles to prevent wind erosion and reduce the dispersion of particulate matter into the air.

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

6.5.14 Impact on climate change

The construction activities for the proposed establishment at MUCE will contribute to climate change by emitting greenhouse gases, including carbon dioxide and noxious gases, from fuel-powered equipment. This impact is direct, short-term, and local, specifically affecting residents in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal council. The emissions can have negative environmental and social consequences, although the overall significance is considered minor. The impact is reversible once construction activities cease.

Mitigation measures

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

6.5.15 Increased Noise level

The construction activities will lead to increased noise levels in nearby areas such as Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal council. The noise, primarily from construction activities like power picks, mechanical shovels, cranes, and transportation vehicles, is expected to temporarily disrupt the local community. The extent of the nuisance will depend on the spatial organization of the site and mainly the location of borrow pits, as well as the crushing plant, concrete plants and other noisy machines compared inhabited areas. Due to an increase in activities and number of operational vehicles, the impacts of noise will cause disturbance to normal university operations. This impact is considered short-term, local, and moderate in nature.

Mitigation measures

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

6.5.16 Increased vibration

The construction work at MUCE, including activities like blasting and impact pile driving, may cause ground vibrations due to the use of various equipment. These vibrations, resulting from increased operational vehicles and construction-related activities, can disrupt the lives of residents in Mkwawa, Mtwivila, and Ilala wards, potentially causing damage to nearby properties during the short-term construction phase. The impact is localized, direct, and has the potential for reversibility.

Mitigation measures

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

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

6.5.17 Generations of Solid Wastes

The proposed establishment at MUCE is expected to generate various types of waste, including hazardous substances. This waste, arising from activities like mobilization and construction, consists of material wastes, packaging materials, hazardous substances, plastic bottles, and food waste. Some materials are hazardous, and non-biodegradable items can have long-term environmental effects. Inadequate waste disposal may lead to pollution, health risks, and contamination of land and water resources. The impact is local, negative, short-term, and of high significance for residents in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal council.

Mitigation measures

- Implement a comprehensive waste segregation system to separate recyclable materials from hazardous and non-biodegradable waste
- Adhere to proper disposal methods for hazardous substances and materials, following established guidelines and regulations.
- Employ certified waste disposal services to ensure safe handling of hazardous waste
- Conduct awareness campaigns for workers and local communities on the importance of proper waste management and its environmental implications.
- Provide training to construction personnel on handling and disposing of different types of waste responsibly.
- Topsoil shall be stock piled and used for reclamation or re-vegetation at the site during landscaping.
- Implement regular environmental monitoring to track the impact of waste generation during construction.
- Use this data to adjust waste management strategies and improve practices if necessary
- Involve local communities in waste management initiatives, encouraging their participation in recycling programs and responsible disposal practices.
- Seek feedback from residents to address any concerns related to waste management.

6.5.18 Generations of Liquid Wastes

The proposed project at MUCE will result in the production of sewage, grey water, and process water. Improper disposal of sewage and septic waste may pose health risks, especially if released untreated into the environment. Grey sewage, though not directly harmful to health, will be generated in significant amounts (Table 6.5). This wastewater discharge can lead to environmental pollution, creating unhygienic conditions with lasting effects on the local community in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal council. The impact is direct, long-term, and localized, with potential health risks and environmental pollution. The effects are primarily reversible with proper waste management measures.

Table 6.5: Types and source of wastewater

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

Mitigation measures

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

6.5.19 Loss of flora (vegetation) and fauna

The clearance of natural vegetation for the proposed development at MUCE in Iringa Municipal Council will have significant environmental and social impacts. The loss of indigenous trees and vegetation cover may alter the area's ecology, leading to increased risks of soil erosion from wind and water. This can result in habitat damage, loss of biodiversity, and a changed panoramic view. The impact is direct, short-term, local, and potentially reversible if mitigation measures are implemented.

Mitigation measures

- Implement a comprehensive plan for revegetation and reforestation in and around the construction site to restore the indigenous flora.
- Integrate green construction practices to minimize the need for extensive clearing of natural vegetation.
- Explore alternative construction methods that reduce the ecological footprint.
- Close supervision of earthworks shall be observed in order to confine land clearance within the project site.
- Implement erosion control measures, such as the installation of sedimentation barriers and erosion control blankets, to prevent soil erosion from wind and water.
- Establish a biodiversity 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 biodiversity and the ongoing mitigation measures.
- Regularly review and update the environmental management plan based on monitoring and feedback.

6.5.20 Impact on natural resource (Energy and water)

The project's construction and operation will result in the consumption of fossil fuels, mainly diesel, to operate transport vehicles and construction machinery. This extensive use of non-renewable fossil energy can have serious environmental implications, affecting its availability, price, and sustainability. Consequently, electricity usage must be moderated, as excessive consumption negatively influences natural resources and their sustainability. This impact is deemed negative, cumulative, of short-term duration, and of moderate significance.

In addition to that, the construction and operation activities will necessitate approximately 30,000 litres of water per day from IRUWASA for activities such as concrete mixing, curing, sanitation, and washing. Excessive water use poses a potential threat to water sources and their sustainability. This impact is considered negative, cumulative, of short-term duration, and of minor significance. These effects are expected during the construction phase of the proposed establishment at Mkwawa University College of Education, impacting residents of Mkwawa, Mtwivila, and Ilala wards within the Iringa Municipal council.

Mitigation measures

- Promote the use of renewable energy sources, such as solar or wind power, to reduce reliance on fossil fuels. Optimize machinery and vehicle operations to minimize fuel consumption.
- Implement recycling and reuse systems for water used in construction activities. Utilize alternative water sources, such as rainwater harvesting, to reduce dependency on municipal water.
- Establish a comprehensive monitoring system to track energy and water usage throughout the construction phase
- Conduct awareness campaigns to educate the local community about the importance of resource conservation during construction
- Implement strict regulations and guidelines to ensure responsible resource management. Regularly assess and audit resource consumption to identify areas for improvement.

- Ensure that the construction complies with environmentally friendly building standards. Implement rainwater harvesting, energy-efficient lighting, and insulation to reduce overall resource impact

6.5.21 Erosion of Exposed Surfaces

The erosion of exposed surfaces resulting from inadequate compaction and resurfacing during construction, exacerbated by factors such as rain, trampling, and vegetation clearance, can lead to increased sediment load in runoffs. This environmental impact may affect the local ecosystem and water quality. Socially, communities in Mkwawa, Mtwivila, and Ilala ward within Iringa Municipal council may experience disruptions and potential loss of resources due to construction-related activities.

This impact is considered indirect, with both short-term and potentially medium-term consequences, primarily affecting the local level. And may be reversible with appropriate mitigation measures, but social disruptions could have varying levels of reversibility depending on the extent of community engagement and restoration efforts.

Mitigation measures

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

6.5.22 Loss of Visual Aesthetics

The proposed project will result in the loss of visual aesthetics for residents in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council. This impact is moderate, localized, and long-term. It is a direct impact on the local community, specifically affecting the views from homes and public spaces. The changes in landscape, removal of natural features, and introduction of artificial elements will alter the overall character of the area, making it look more urban. Additionally, the potential operation of construction activities at night may contribute to increased light pollution. The environmental and social aspects impacted include physical factors

such as geology, landform, and ecology, as well as aesthetic factors like proportion, scale, and colour views. The impact is irreversible as the landscape features, once altered, may not be fully restored.

Mitigation measures

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

6.6 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. NEGATIVE SOCIAL IMPACT

6.6.1 Loss of employment

Upon finishing the construction at MUCE, 130 workers from Mkwawa, Mtwivila, and Ilala wards in Iringa Municipal council will face unemployment, causing a direct and short-term impact on the local community. This loss of employment is reversible if alternative opportunities are created.

Mitigation measures

- Implement skill development programs to enhance the employability of the affected workers.
- Provide training in areas with high demand in the local job market.
- Informing workers, the project duration when employing them
- Establish job placement services to assist displaced workers in finding alternative employment opportunities.

- Educating the labour force on the need to save part of their wages.
- Paying severance benefit to all laid off workers according to the provision of the labour laws.
- Establish community support programs to provide financial assistance or counselling services to those facing immediate economic challenges.

6.6.2 Loss of business opportunities

The local community in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council will experience a direct and short-term loss of business opportunities during the demobilization phase for the planned construction at Mkwawa University College of Education. This will particularly affect local traders of construction materials and small-scale entrepreneurs selling food to construction workers.

Mitigation measures

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

B. NEGATIVE ENVIRONMENTAL IMPACTS

6.6.3 Dust and noise pollution from demolishing works

The proposed demolition phase at MUCE will cause short-term environmental and social impacts, including dust and noise pollution. The release of dust particles and noise pollution from machinery like excavators, electric grinders, and mixers will affect air quality and pose health hazards to both site workers and residents in neighboring areas. Particulate matter (PM) will be a significant contributor to air pollution, leading to reduced visibility. This impact is considered moderate, local, and short-term.

Mitigation measures

- Employ dust control technologies such as water spraying systems to minimize the release of dust particles during demolition activities. This will help maintain better air quality.

- Implement noise reduction strategies, including the use of sound barriers, noise-dampening equipment, and scheduling noisy activities during specific times to minimize disruption to nearby residents.
- Provide workers with personal protective equipment (PPE) such as masks and ear protection to mitigate health risks associated with dust inhalation and prolonged exposure to high noise levels.
- Conduct awareness programs for local residents, informing them about the demolition schedule, potential impacts, and measures being taken to mitigate dust and noise pollution. This foster understanding and cooperation.
- Establish a monitoring system to regularly assess air quality and noise levels. Implement a reporting mechanism to promptly address any deviations from acceptable standards, allowing for quick corrective actions.
- Explore and utilize demolition methods that generate less dust and noise, such as mechanical methods that are more controlled and produce fewer airborne particles.

6.7 POSSIBLE POTENTIAL IMPACTS DURING OPERATIONS PHASE

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

A. POSITIVE IMPACT

6.7.1 Increase of admission of students to MUCE

The increase in student admissions at MUCE due to the proposed project will have both environmental and social implications. In environmental terms, the construction of new buildings may lead to changes in local ecosystems and resource utilization. Socially, the influx of students will enhance access to higher education, benefiting the country. During the operation phase, residents of Mkwawa, Mtwivila, and Ilala wards in Iringa Municipal council will experience changes in their immediate environment, with potential effects on local social dynamics. The impact is considered indirect, medium-term, local, and potentially reversible with proper mitigation measures.

Enhancement measures

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

6.7.2 Increase of revenue to MUCE

The rise in MUCE's income, driven by a boost in student enrolment and university fees, will enhance the financial stability of academic institutions. This financial improvement supports effective governance and the realization of academic goals at national and regional levels. As new buildings are proposed at MUCE, individuals in Mkwawa, Mtwivila, and Ilala wards in Iringa Municipal Council will directly experience positive impacts during the short term. The overall impact is local, with the potential for long-term benefits. The changes are reversible if the new buildings do not meet the expected outcomes.

Enhancement measures

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

6.7.3 Job creation and employment opportunities

The impact on the social aspect of the proposed establishment at MUCE during the operation phase is significant in terms of job creation and employment opportunities. This impact is primarily indirect, as it involves jobs created by the positive influences of the institution on economic sectors such as cleanliness, stationeries, catering, and commercial activities, as well as agriculture, livestock, energy, and the water sector. The ripple effect extends beyond the local community, contributing to the regional and national economy. The impact is expected to be long term, affecting the areas of Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal council. The overall effect is cumulative, involving a continuous and growing influence on the community and economy.

Enhancement measures

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

6.7.4 Increased commercial and social activities around project locations

In general, the establishment at MUCE is expected to lead to increased commercial and social activities in the surrounding areas. The construction and operation of the proposed project are

likely to attract more businesses, driven by the demand for various services and goods needed to support the university. Additionally, the presence of the university is anticipated to contribute to the growth of existing businesses in the project location. This impact is both direct and cumulative, occurring in the short and long term, primarily affecting the local community. The changes are potentially reversible depending on the adaptability of local businesses.

Enhancement measures

- Establish platforms for ongoing dialogue between the university and local businesses to understand their needs and concerns
- Offer training programs and workshops to local residents to enhance their skills and make them more employable in the growing market.
- Collaborate with local vocational institutions to provide specialized training in areas related to the services and goods in demand
- Organize cultural and social events on the university campus that attract residents from the surrounding areas, fostering a sense of community and promoting local businesses.
- Develop and implement policies that prioritize the procurement of goods and services from local businesses, thereby supporting the local economy.

6.7.5 Government revenue collection and economic growth

The increase in revenue generated by the proposed project at MUCE will have a positive and significant impact at the regional level. Various governmental regulatory authorities, including the National Environmental Management Committee (NEMC), Iringa Municipal Council, Iringa Water Supply and Sanitation Authority (IRUWASA), Tanzania Electricity Supply Company (TANESCO), FIRE and Rescue Force, and OSHA, will benefit from the collected funds. The cumulative effect of sustained revenue generation will result in a long-term positive impact on the region. The funds distributed through various governmental bodies will play a crucial role in regional development, contributing to job creation, improved infrastructure, and overall economic prosperity

This impact will directly benefit local communities in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council. The increase in revenue will positively impact the region in the long term. The collected funds, distributed through various governmental bodies, will contribute to regional development, enhancing living standards.

Enhancement measures

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

6.7.6 Growth of Trade and Increased Investment

The proposed project at MUCE and the subsequent increase in student enrolment are expected to stimulate trade and attract investment. This growth is anticipated to draw investors from both

local and external communities, leading to the development of surrounding areas, including Mkwawa, Mtwivila, and Ilala wards. Service providers, such as food vendors and kiosks, are likely to establish and expand during the construction phase, catering to the needs of both skilled and unskilled labourers working on the proposed project.

The impact is described as indirect, indicating that the economic stimulation is a result of the project's influence on the region. The medium-term nature of the impact suggests that the positive effects may take some time to fully materialize. Additionally, the term "potentially reversible" implies that the sustainability of the impact depends on the nature of investments attracted during this phase. If the investments are conducive to long-term development, the impact may be sustained; otherwise, it could be reversible

Enhancement measures

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

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

The proposed project at MUCE aims to enhance the production of a skilled labour force, aligning with national development policies. This initiative anticipates an increase in enrolment and the production of high-quality professionals, contributing to the country's economic and social growth. MUCE role is crucial in supporting Tanzania's industrialization efforts by producing graduates tailored to meet the demands of the labour market. This will directly impact the local communities of Mkwawa, Mtwivila, and Ilala wards in Iringa Municipal Council. Also, this impact is expected to be long-term as the project contributes to the production of a skilled workforce, supporting the nation's economic growth. The effect is reversible if the project is not sustained.

Enhancement measures

- The project aims to boost student enrolment, indicating a proactive approach to meet the growing demand for skilled professionals in alignment with national development policies.
- MUCE is committed to providing high-quality education to its students, ensuring that graduates possess the necessary skills and knowledge to contribute effectively to the nation's development goals
- The project emphasizes aligning its curriculum and training programs with the priorities outlined in national development policies. This ensures that graduates are well-prepared to address the specific needs and challenges of the country.
- MUCE recognizes its crucial role in supporting Tanzania's industrialization efforts. By tailoring its educational programs to meet the demands of the labour market, the institution directly contributes to the development of a skilled workforce that can drive economic growth in the industrial sector.

6.7.8 The growth of banking activities in the project area

The expansion of banking activities in the project area, driven by the growth in population, investment, and trading activities, is anticipated to attract more banks to establish offices at Mkwawa University College of Education (MUCE) and the surrounding communities of

Mkwawa, Mtwivila, and Ilala wards. The rise in student enrolment, employment opportunities, and increased income for residents and workers in the area are expected to enhance the circulation of funds, making it attractive for additional banking institutions. Furthermore, the expectation is that both skilled and unskilled employees at MUCE will receive their payments through the banking system; further incentivizing banks to operate in the area. The impact is considered cumulative, with long-term effects on the local financial landscape and potentially reversible (depending on economic dynamics and future developments).

Enhancement measures

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

B. NEGATIVE SOCIAL IMPACTS

6.7.9 Increased incidences of diseases and ill health

The operation phase of proposed project at MUCE could directly contribute to a higher incidence of diseases and health issues among the local communities in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council. The increased concentration of people from different places may lead to the spread of communicable diseases, making this a short to medium term, localized, and potentially reversible (depending on health interventions and preventive measures implemented during and after the project.

Mitigation measures

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

- Establish a robust system for monitoring and surveillance of health conditions in the affected areas. This includes early detection of potential outbreaks, tracking disease trends, and implementing timely responses.
- Collaborate with local health authorities and organizations to leverage their expertise and resources. This partnership can enhance the effectiveness of health interventions and ensure a coordinated response to health challenges.
- Develop and implement emergency response plans to handle any sudden increases in disease incidences. This includes having protocols in place for rapid deployment of medical teams and resources in the event of an outbreak.

6.7.10 Increased pressure on social services and utilities

The proposed establishment at MUCE during the operation phase is likely to directly strain local social services and utilities in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council. The increased student population and employment opportunities may exacerbate the pressure on already limited infrastructure for health, worship areas, water, electricity, and other services. This impact is expected to be both direct and cumulative in the long term, potentially placing an irreversible burden on the existing service delivery system.

Mitigation measures

- Implementing strategic plans for the expansion and improvement of local infrastructure, such as health facilities, places of worship, water supply, and electricity. This may involve constructing new facilities and upgrading existing ones to accommodate the growing population
- Investing in training and capacity building programs for local service providers to enhance their ability to cope with increased demand. This could involve training healthcare professionals, utility workers, and other service providers to efficiently manage the rising needs of the community.
- Conducting outreach programs to involve the local community in the planning and implementation process. This engagement helps in identifying specific needs and concerns of the community, ensuring that the development initiatives are culturally sensitive and well-received.
- Implementing employment generation programs that focus on local hiring. By prioritizing the employment of local residents, the impact on housing, transportation, and other services can be mitigated, reducing the strain on social services.
- Implementing measures to optimize the use of resources, such as energy-efficient technologies and water conservation practices. This can contribute to reducing the overall demand on utilities, making them more sustainable in the face of increased pressure.
- Establishing strong partnerships with local government authorities to jointly plan and implement infrastructure projects. This collaboration ensures that the development aligns with the overall growth strategy of the area and leverages available resources efficiently. Extraction of underground water resources;

6.7.11 Increased level of crimes

The anticipated increase in the population due to the recruitment of staff and students, as well as the influx of people attracted to invest in goods and services, is expected to lead to a rise in the level of crimes. Concentration of individuals from diverse backgrounds and behaviours is likely

to result in changes in norms and behaviours, leading to negative sociological impacts, particularly in local areas like Mkwawa, Mtwivila, and Ilala wards. Also, this impact is expected to be medium to long-term, indirect as the crime increase is a consequence of demographic changes, localized, and potentially reversible with appropriate measures (e.g., enhanced security and community programs.

Mitigation measures

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

6.7.12 Incidence of Gender Based Violence

The operation phase for the proposed establishment at MUCE is expected to impact the social aspect by potentially influencing the incidence of gender-based violence among residents in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council. Additionally, MUCE students may experience effects related to the incidence of gender-based violence.

This impact is expected to be direct, short to medium term, and potentially reversible (through targeted interventions and awareness programs).

Mitigation measures

- The project will prepare a GBV Action Plan that ensures project awareness raising strategy (for workers and community members), a list of GBV service Providers to which GBV survivors will be referred, revisions to the GRM to ensure it can address GBV complaints, and information on GBV allegation procedures in the workplace.
- Implement comprehensive awareness programs within Mkwawa, Mtwivila, and Ilala wards to educate residents about the importance of gender equality, consent, and the prevention of GBV.
- Promote community dialogues to address cultural norms contributing to GBV and encourage positive behavioural changes

- Establish and enforce clear institutional policies at MUCE to prevent and address GBV among students and staff.
- Provide support services such as counselling and helplines within MUCE to assist those affected by GBV.
- Conduct training sessions for MUCE students and staff on recognizing and responding to signs of GBV.
- Equip community leaders and relevant stakeholders with the skills to identify and address GBV issues effectively.
- Create safe spaces within MUCE and the surrounding community where individuals can seek refuge and support.
- Implement security measures to enhance the safety of students and residents, particularly during vulnerable times.
- Establish a robust monitoring and evaluation system to track the effectiveness of interventions in reducing GBV.
- Regularly assess the incidence of GBV and adjust strategies accordingly to address emerging challenges.
- Collaborate with local authorities and law enforcement to ensure a swift response to reported cases of GBV. Also, foster partnerships with local organizations working on GBV prevention to leverage resources and expertise
- Empower students with the knowledge and skills to advocate against GBV and contribute to a safer community.
- Support community-led initiatives that empower individuals, especially women, to challenge and overcome GBV

6.7.13 Disruption of traffic flow

The operation phase of the proposed buildings at MUCE may lead to disruption in traffic flow, particularly with increased bicycles, motorcycles, and cars near university entrances. This poses a risk of traffic congestion and safety concerns in the surrounding areas. Collaboration with the local government, specifically the road management authority, will be necessary to address these issues, possibly through the installation of additional signboards and coordinated traffic management.

Mitigation measures

- Establish a partnership with the local government and road management authority to jointly address traffic concerns. This collaboration is essential for effective coordination and implementation of traffic management solutions.
- Develop a comprehensive traffic management plan that considers the anticipated increase in vehicular and non-motorized traffic during the operational phase. This plan should outline specific measures to mitigate congestion and enhance safety in the surrounding areas.
- Strategically place additional signboards to guide and inform road users about the changes in traffic patterns, entrances, and other relevant information. Clear signage can help prevent confusion and improve overall traffic flow.
- Implement coordinated traffic control measures to optimize the flow of vehicles and ensure smooth operation near university entrances. This may involve the deployment of traffic personnel during peak hours or special events to manage the increased traffic.

- Launch a public awareness campaign to inform the community, including students, faculty, and local residents, about the expected changes in traffic conditions. This could include distributing informational materials, organizing workshops, and using digital platforms to educate the public.
- Explore the use of technology, such as smart traffic lights or traffic monitoring systems, to enhance traffic flow efficiency. These solutions can be integrated with the existing infrastructure to dynamically manage traffic based on real-time conditions.
- Establish a feedback mechanism for the community to report any issues related to traffic disruption. This allows for continuous monitoring and adjustment of the traffic management plan based on feedback from the users.

6.7.14 Increased Water Demand

Increased water demand during the operation phase of the proposed establishment at MUCE will have environmental and social consequences. This impact may strain local water resources and affect communities in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council. This is indirect impact, medium term, local and potentially reversible depends on water resource management measures.

Mitigation measures

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

6.7.15 Increased Energy Demand

The proposed project at MUCE is expected to cause a notable negative impact on the local community during their operation. This impact is characterized by a significant increase in energy consumption, particularly in the energy-intensive laboratory operations involving equipment, climate control, and lighting. As a result, there will be a surge in the overall demand for energy resources, potentially leading to a greater carbon footprint and strain on existing energy infrastructure. To mitigate this impact, it is crucial to implement comprehensive energy-saving measures and efficiency strategies. This is direct impact, medium term, local and potentially reversible depends on energy resource management measures.

Mitigation measures

- Put off all lights immediately when not in use or are not needed.
- Use energy conserving electric lamps for general lighting.
- Integrate energy-efficient technologies and equipment in laboratory operations, focusing on reducing energy consumption without compromising functionality.
- Implement advanced climate control systems that optimize heating, ventilation, and air conditioning (HVAC) to ensure energy is used more efficiently, adapting to specific needs and usage patterns
- Replace traditional lighting systems with energy-efficient LED lighting and incorporate motion sensors to automatically control lighting based on occupancy, reducing unnecessary energy consumption.
- Invest in renewable energy sources, such as solar panels or wind turbines, to supplement the energy demand and decrease reliance on traditional, carbon-intensive sources.
- Conduct awareness programs to educate staff on energy conservation practices, encouraging them to adopt behaviours that contribute to energy efficiency in their daily operations.
- Implement protocols and procedures to enhance operational efficiency, minimizing idle time for equipment and ensuring that energy-intensive processes are streamlined for maximum productivity.
- Conduct regular energy audits to identify areas of improvement and track energy performance over time. This will help refine energy-saving strategies and address any emerging issues promptly.
- Engage with local energy providers to explore collaborative measures, such as demand-response programs or incentives for adopting energy-efficient practices.

C. ENVIRONMENTAL IMPACTS

6.7.16 Increased water pollution

The wastewater current management at MUCE involves the discharge of wastewater, including hazardous liquid waste from laboratories, into the municipal public sewer system. Concerns have been raised about potential water pollution from laboratories affect the biological activities within Municipal ponds lead to the pollution, emphasizing the need for careful containment and monitoring of hazardous liquid waste from laboratory before being disposed into public sewer.

This impacts the local communities in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council, as well as MUCE students. It is a direct, potentially reversible impact with both short-term and long-term consequences.

Mitigation measures

- Upgrade the laboratory wastewater containment systems to prevent the discharge of hazardous liquid waste into the municipal public sewer system.
- Implement advanced treatment technologies to ensure that wastewater, especially from laboratories, undergoes proper treatment before being released
- Establish a robust monitoring system to regularly assess the quality of wastewater discharged from MUCE facilities.
- Implement strict compliance measures to ensure that the hazardous liquid waste meets acceptable environmental standards before disposal

- Conduct educational programs within MUCE to raise awareness among laboratory staff and students about the potential environmental impact of improper wastewater disposal.
- Promote responsible laboratory practices and waste management to reduce the generation of hazardous liquid waste
- Collaborate with local communities in Mkwawa, Mtwivila, and Ilala wards to create awareness about the environmental consequences of water pollution. And involve community members in monitoring activities and reporting any observed anomalies in water quality
- Develop and implement emergency response plans to address any accidental spills or releases of hazardous substances into the wastewater system.
- Conduct regular drills to ensure that MUCE staff is well-prepared to respond to emergencies promptly.

6.7.17 Health and safety risks due to fire hazards

The construction of new buildings at MUCE during the operational phase poses a potential fire hazard due to the use of combustible materials and machinery. Electrical faults, common culprits in Tanzanian building fires, may lead to severe consequences such as loss of lives, serious injuries, and property damage. The risk is particularly relevant in environments like laboratories and training workshops where certain chemicals can contribute to fire outbreaks. The impact is immediate and could lead to loss of lives, injuries, and property damage and potentially reversible (with proper fire safety measures).

Mitigation measures

- Conduct thorough inspections of electrical systems to identify and rectify potential faults before they lead to fire incidents.
- Install fire-resistant wiring and use circuit breakers to mitigate the risk of electrical faults.
- Utilize non-combustible or fire-resistant materials in critical areas, especially in laboratories and training workshops.
- Implement strict construction practices that adhere to safety standards, ensuring that the risk of fire is minimized during the building process
- Provide comprehensive fire safety training to all personnel working in the new buildings, with a focus on proper handling of equipment, chemicals, and emergency evacuation procedures.
- Conduct regular fire drills to ensure that everyone is familiar with the evacuation routes and emergency protocols
- Install state-of-the-art fire detection systems, including smoke detectors and fire alarms, to ensure early identification of potential fire incidents.
- Implement an effective fire suppression system, such as sprinklers, to control and extinguish fires in their early stages
- Establish strict protocols for the storage and handling of chemicals in laboratories, minimizing the risk of chemical-related fire outbreaks.
- Ensure that all personnel are trained in proper chemical storage and emergency response procedures
- Implement a monitoring system to continuously assess fire risks during the operational phase.

- Employ surveillance cameras in critical areas to enhance the early detection of potential fire hazards.

6.7.18 Storm water generation and overflow

The proposed development at MUCE is expected to generate significant stormwater due to the presence of pavements, concrete surfaces, and buildings. Parking spaces and building roofs will contribute to stormwater runoff, potentially compromising the land's infiltration capacity. This runoff may impact downstream structures, contribute to soil erosion, and degrade water quality in the surrounding environment. This may affect local communities in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council. MUCE students might also experience indirect effects as the stormwater runoff could compromise the surrounding environment.

This indirect impact (potential impact on structures downstream) is medium term, local and potentially reversible (depending on stormwater management measures implemented during construction).

Mitigation measures

- Implementing a comprehensive stormwater management system to capture, detain, and treat runoff.
- Installing permeable pavements to promote infiltration and reduce runoff.
- Constructing retention and detention basins to temporarily store stormwater and control the release of runoff into the drainage system
- Incorporating vegetative swales and buffer strips to slow down and filter stormwater, promoting natural infiltration and reducing soil erosion
- Utilizing green roofs on buildings to absorb and slow stormwater runoff, reducing the volume and velocity of water entering the drainage system
- Conducting public awareness campaigns and educational programs to inform local communities, MUCE students, and stakeholders about the importance of stormwater management and their role in minimizing its impact.
- Developing an emergency response plan to address any unforeseen issues related to stormwater overflow promptly.
- Establishing a long-term maintenance plan to ensure the continued effectiveness of stormwater management infrastructure throughout the operational phase

6.7.19 Generation of Solid waste

The construction and operational phase of new buildings at MUCE will result in the generation of significant amounts of solid waste, including waste papers, boxes, foils, food leftovers, plastic bottles, bags, voucher materials, and more. Improper management of these wastes could lead to environmental degradation and pollution in and around the project area, potentially extending beyond the site through processes like wind and water denudation.

This impact is of concern to local communities in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council. The impact is characterized into direct, localized, medium term and potentially reversible (with proper waste management practices).

Mitigation measures

- Implement a comprehensive waste segregation system to categorize different types of waste materials.
- Establish recycling facilities to process recyclable materials such as paper, cardboard, plastics, and metals.
- Develop a detailed waste management plan that outlines proper disposal methods, recycling procedures, and strategies for reducing waste generation.
- Ensure adherence to the waste management plan throughout the construction and operational phases
- Conduct training sessions for construction and operational staff on proper waste handling, segregation, and disposal practices.
- Raise awareness among the local communities in Mkwawa, Mtwivila, and Ilala wards about the importance of responsible waste management
- Ensure strict compliance with local environmental regulations and waste management guidelines. Also, obtain necessary permits and approvals related to waste disposal and management.

6.7.20 Generation of Hazardous waste

The generation of hazardous waste during the operation phase of the proposed project at MUCE will have environmental repercussions due to the disposal of chemicals, oils, contaminated materials, and medical waste. Additionally, it will impact the social aspect by potentially affecting the health and well-being of the staff, MUCE students as well as local community (residents of Mkwawa, Mtwivila, and Ilala wards). This impact is expected to be direct, Short-term, Local and reversible impact potentially depends on waste management practices.

Mitigation measures

- Implement measures to minimize the generation of hazardous waste through efficient processes and technologies.
- Establish a waste segregation system to separate different types of waste at the source, facilitating proper disposal and recycling.
- Provide training for staff on safe handling and storage of hazardous materials to reduce the risk of accidents and spills.
- Implement secure storage facilities with appropriate containment measures to prevent leaks or contamination
- Conduct regular environmental monitoring to assess the impact of hazardous waste disposal on soil, water, and air quality.
- Implement early warning systems to detect and respond promptly to any potential environmental hazards
- Develop and enforce stringent health and safety protocols for workers, students, and the local community to minimize health risks associated with hazardous waste exposure.
- Provide protective equipment and training to ensure the well-being of individuals working with or near hazardous materials
- Conduct outreach programs to raise awareness among the local community about the potential hazards associated with the project.
- Establish communication channels to address community concerns and incorporate feedback into waste management practices

- Develop a comprehensive emergency response plan to address accidental spills, leaks, or other hazardous incidents promptly.
- Conduct regular drills and training exercises to ensure that all stakeholders are well-prepared to respond to emergencies.
- Ensure strict adherence to local and national regulations regarding hazardous waste management.
- Obtain all necessary permits and approvals, and regularly update waste management practices based on evolving regulatory requirements.

6.7.21 Generation of Liquid waste

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

Mitigation measures

- Develop and implement comprehensive waste management plans specifically targeting liquid waste generated. This includes proper disposal methods, recycling initiatives, and the use of environmentally friendly practices.
- Optimize sanitation systems to minimize liquid waste production. This may involve the installation of water-efficient fixtures, regular maintenance to address leaks, and the use of technologies that reduce water usage in sanitation facilities.
- Implement strategies to control and manage rainwater runoff to prevent contamination. This could involve the installation of permeable surfaces, green infrastructure, and drainage systems designed to capture and treat runoff before it enters water bodies.
- Promote water-efficient practices in laboratories to reduce water consumption. This may include the use of advanced equipment that minimizes water usage, recycling systems for laboratory water, and the adoption of best practices in water conservation.
- Establish monitoring programs to regularly assess liquid waste generation and ensure compliance with environmental regulations. This involves conducting regular inspections, implementing corrective actions when necessary, and maintaining records to track the effectiveness of mitigation measures
- Conduct training programs for staff involved in construction and operation to raise awareness about the importance of liquid waste management. Promote a culture of environmental responsibility and provide guidelines for responsible waste disposal.
- Develop and implement emergency response plans to address unforeseen spills or incidents related to liquid waste. This includes having the necessary equipment and trained personnel to respond promptly to minimize the impact on the environment.

6.8 IMPACTS DURING DECOMMISSIONING PHASE

A. NEGATIVE SOCIAL IMPACTS

6.8.1 Loss of employment and business opportunities

The decommissioning phase of the proposed project at MUCE will lead to job and business losses all person dependents on the project, such as suppliers of various services (e.g., security

and cleaning companies) and goods (such as food stuff and stationaries). This will directly impact the residents of Mkwawa, Mtwivila, and Ilala wards in Iringa Municipal council. The effect is negative, lasting, and moderately significant. It involves both direct and indirect consequences, primarily affecting the local community, and is irreversible.

Mitigation measures

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

6.8.2 Loss of revenue to institutions and the government

The discontinuation of the new building project at MUCE will result in a cessation of revenue, impacting both local and central governments. In addition to that, resident of Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council will experience a reduction in economic opportunities and government funding. This impact is direct, high, local, long term and will be potentially reversible (if alternative revenue sources are developed).

Mitigation measures

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

6.8.3 Occupational Health and Safety Hazards to workers

Demolition and site reinstatement entail occupational health and safety risks, such as long-term health issues, injuries, fatalities, and property damage. Hazards like excessive noise, dust emission, and injuries from moving equipment must be managed. These risks, including long-term health consequences, injuries, and property damage, particularly affect workers and residents in Mkwawa, Mtwivila, and Ilala wards within Iringa Municipal Council. The impact is

direct, potentially long-term, and local, with reversible consequences if proper precautions are taken.

Mitigation measures

- Conduct a thorough risk assessment to identify potential hazards specific to the decommissioning phase.
- Evaluate the risks associated with excessive noise, dust emission, and moving equipment to understand their impact on workers' health and safety
- Provide appropriate PPE such as respiratory masks, ear protection, eye protection, and safety gear to workers to minimize exposure to hazards
- Conduct training sessions to educate workers on the potential risks and the proper use of safety equipment.
- Increase awareness about the importance of following safety protocols and procedures.
- Implement measures to control excessive noise, such as using noise barriers, scheduling noisy activities during specific times, and providing noise-canceling equipment for workers.
- Utilize dust suppression techniques, such as water spraying and dust barriers, to minimize the dispersion of dust particles during demolition activities.
- Utilize dust suppression techniques, such as water spraying and dust barriers, to minimize the dispersion of dust particles during demolition activities.
- Develop and communicate a comprehensive emergency response plan to address any unforeseen incidents promptly.
- Provide training on emergency procedures and ensure that workers are familiar with evacuation routes and first aid protocols
- Implement a regular health check-up program for workers to monitor and address any health issues arising from exposure to occupational hazards.
- Engage with the local community to raise awareness about the ongoing decommissioning activities and potential risks. And establish communication channels to address concerns and feedback from residents in Mkwawa, Mtwivila, and Ilala wards.

6.8.4 Traffic accident

During the decommissioning phase of the proposed establishment at MUCE, the transportation of demolition materials poses a risk of traffic accidents. This could impact both workers and the general public, especially in residential areas along the transport route. The impact is direct and indirect (offsite), negative, short term and of high significance.

Mitigation measures

- Develop a comprehensive traffic management plan that includes designated routes for transporting demolition materials. Ensure coordination with local authorities to minimize disruption and avoid congested residential areas.
- Schedule transportation of demolition materials during off-peak hours to minimize the impact on regular traffic flow. This can help reduce the likelihood of accidents and mitigate congestion
- Employ escort vehicles to accompany transportation trucks, providing advance notice to other road users. Clearly mark the vehicles carrying demolition materials with appropriate signage to alert drivers and pedestrians

- Conduct public awareness campaigns to inform residents along the transport route about the decommissioning activities. Provide information on alternative routes and the timing of material transportation to minimize inconvenience
- Ensure that workers involved in transportation activities are adequately trained on safety protocols. Emphasize the importance of adhering to traffic regulations and maintaining vigilance during transportation.
- Develop a robust emergency response plan in case of accidents. This includes training personnel on immediate response measures, establishing communication protocols with local emergency services, and providing necessary equipment for rapid intervention.
- Implement a system for regular monitoring of transportation activities, with mechanisms for reporting any incidents or near misses. This allows for proactive identification of potential issues and prompts corrective action.

B. NEGATIVE ENVIRONMENTAL IMPACTS

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

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

Mitigation measures

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

6.8.6 Noise pollution from demolishing works

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

Mitigation measures

- 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
- Install temporary acoustic barriers around the demolition site to contain and reduce the spread of noise. These barriers can help absorb and block sound waves, mitigating the impact on neighbouring areas.
- 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.
- se 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.

6.8.7 Air pollution due to dust and gas emission

During the decommissioning phase of the proposed establishment at MUCE air pollution is anticipated due to dust emissions. The demolition process, involving sledgehammers and jackhammers, as well as land levelling and grading, will release dust into the atmosphere. The transportation of debris from the site will contribute to atmospheric dust. This will affect local atmospheric conditions, potentially impacting site workers, nearby communities, and individuals along the disposal route. The impact is considered both direct, indirect, cumulative, negative, short term and of low moderate significance.

Mitigation measures

- Implement effective dust control measures such as water spraying or dust suppressants during demolition activities to minimize airborne dust particles.

- Explore alternative demolition techniques that generate less dust, such as mechanical methods that reduce the reliance on sledgehammers and jackhammers.
- Develop and enforce strict site management practices to ensure proper containment and disposal of dust-generating materials. This includes covering and securing debris during transportation.
- Introduce temporary vegetative cover on exposed soil to reduce dust emissions from land levelling and grading activities.
- Implement a comprehensive air quality monitoring program to assess the levels of pollutants during decommissioning. This will enable timely identification of potential issues and allow for adjustments to mitigation measures.
- Mandate the use of appropriate PPE for site workers to minimize their exposure to airborne pollutants.
- Conduct regular outreach programs to communicate with nearby communities about the decommissioning activities, potential air pollution impacts, and mitigation measures. Establish a communication channel for addressing concerns and feedback.
- Develop a transportation plan that minimizes dust emissions during the transportation of debris from the site. This may include covering trucks or choosing routes with less residential or sensitive receptor areas.
- Ensure strict adherence to local environmental regulations and standards related to air quality and pollution control. Obtain necessary permits and approvals before initiating decommissioning activities.
- Provide comprehensive training for site workers on environmental best practices and the importance of adhering to mitigation measures. This will help in fostering a culture of environmental responsibility.

6.9 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).

This subsection presents cumulative impacts of the proposed projects at MUCE campus. The mitigation measures to either prevent or minimize risks related to potential cumulative impacts have already been planned in chapter seven.

6.9.1 Cumulative Socio-Economic Impacts

a. Positive Cumulative Socio-Economic Impacts

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

- Apart from that, the project will increase revenue collection by the university, and boost the economy of those operating the cafeteria, hence cumulative economic benefits.
- The laboratories will enhance learning and teaching environmental and hence more capacitated graduates.
- The university buildings will provide safety, easy accessibility to classrooms and reduce negative social interaction with the outside community. The university buildings will also enable the university to increase students' enrolment.
- Together, the four will increase revenue collection by the University and hence facilitate growth and competitiveness in the market. Furthermore, no other developments have been identified in the study area, which could give rise students enrolment or enhance the learning environment.

b. Negative Cumulative Socio-Economic Impacts

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

6.9.2 Cumulative impacts of Bio- physical environment

a) Cumulative impacts of liquid and solid waste

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

b) Incremental noise and air pollution

The main sources of noise and air emissions at the campus are traffic and standby power generators. The proposed project shall definitely contribute to increase traffic flow within the campus, both during construction and operation. The proposed infrastructure shall be provided with standby power generators. These shall cumulatively increase noise levels and exhaust gasses emissions within the University Campus.

c) Greenhouse Gas Emissions and Climate Change

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

6.10 Analysis of Project Alternatives

Consideration of project implementation alternatives is crucial in ensuring that the developer and decision-makers have a wider base from which they can choose the most appropriate option. The planning stage of this project considered the No project alternative site, alternative energy sources, alternative waste management technologies, alternative construction materials and alternative roofing materials. These are explained hereunder.

6.10.1 No project alternative

The no project alternative entails retaining the current status quo (No construction of the proposed four building structures at MUCE 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 MUCE is designed to revitalize and expand the capacity of the University to contribute to key areas for innovation, economic development and labour market relevance. The proposed modern infrastructure 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.

Based on the enormous benefit of the proposed project at national level, the No project alternative was abandoned. It is clear that identified impacts associated with project implementation are mostly temporary, and shorter, and are manageable at the University level.

6.10.2 Alternative Energy Sources

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

Alternative one - Electricity*:* As it is the case in most of developing countries, supply of electricity from national grids is not reliable as it mostly originates from hydroelectric power generators, which depend on rainfall frequency, intensity and pattern.
Alternative two - Diesel generators: These utilize fossil fuels, which tend to emit greenhouse gases especially when operated for a long time. As such, diesel generators are used as standby power supply during outages.

Alternative three - Compressed Natural Gas (CNG): The University considered the use of CNG, especially in the laboratories. CNG is the cleanest gas, thus its utilization would reduce environmental pollution. However, the University is currently not connected to such service.

Alternative four - Solar energy*:* the last alternative considered was the installation of solar panels to harvest solar energy. It is intended that the solar energy be used for lighting within the buildings. It is also intended to install solar lights in various locations along the streets.

Conclusions: An evaluation of the four alternatives based on capital costs, availability of adequate supply, reliability, and environmental protection revealed that at all four options could be used together. Therefore, it is planned to connect the proposed infrastructure to electricity from the National grid as a basic power supply. Provisions will be made for installing solar panels and connections to CNG in the future. However, since some machines and laboratory

equipment require high voltage, which could not be supplied by solar energy, standby generators will also be provided, especially for the laboratories.

6.10.3 Water supply Alternative

Alternative one: Water Supply (surface water) from the operating water utility company

Water supply from IRUWASA is the option considered to be appropriate as the water supply network is within the campus and therefore can guarantee reliable, clean and safe water supply to the proposed buildings.

Alternative two: Groundwater Extraction

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

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

Alternative three: Rainwater Harvesting

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

Conclusion: The University opted to use a combination of two water sources namely piped water supply from IRUWASA and rain water harvesting. IRUWASA water although relatively expensive, it is of most reliable quality. Therefore, IRUWASA water will be used for domestic purposes and in the running of laboratory. IRUWASA water will be complimented by rainwater, which will be used for cleaning and gardens maintenance.

6.10.4 Alternative of wastewater management

Alternative one: Constructed treatment wetland

The University considered adoption of constructed wetlands, which are engineered system designed and constructed to copy natural processes taking place in the natural wetlands. Constructed wetlands remove pollutants in wastewater through the combination of physical, biological and chemical processes. They are either subsurface flow where the flow is below the surface of soil or surface flow where the flow of wastewater is above the soil. This alternative is feasible compared to waste stabilization ponds /lagoons given the space available for the proposed project.

Alternative two: Use of the existing direct sewerage systems

This involves the discharge of sewer directly to municipal sewer system. For this reason, there is cost implication to run this compared to WSP since the college pays 75% of water bills as sewer charges.

Alternative three: 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 wastewater treatment facilities. Since space is not a limiting factor for the project, this is a preferred option.

Advantages of using WSP include

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

Disadvantages of using WSP include

a) WSP require more space than other wastewater treatment facilities;
b) If not properly managed, wastewater 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 class rooms, students' hostels and the administration block, the alternative was preferred.

Conclusion: Analysis of the three-alternative showed that alternative two is the most favourable. The construction of the infrastructure will be connected directly to the existing municipal sewer system, to convey wastewater to existing treatment facilities.

6.10.5 Solid Waste Management Alternatives

The proposed project will generate a considerable large amount of solid waste (estimated at 3.5tonnes per day) from hostels, stationeries, workshops, laboratories, restaurants and offices. The University considered two alternatives namely:

- Collected by the Iringa municipal council
- Collection, sorting, resource recovery and transportation of remaining waste to is done by Iringa municipal for final disposal.

Alternative 1: Alternative one will involve transportation of huge amounts of waste to the dumpsite. Since solid waste management is a service and doesn't generate any revenue, such practice will become a burden to the University. The generated amount will require at least one trip per day by Municipal council which is about 3km from the university. Therefore, alternative one was abandoned.

***Alternative 2*:** Alternative two will involve integrated solid waste management; where by management will start with.

- Efforts to reduce waste generation:
- Waste segregation and sorting into degradable and non-degradable; and recyclables and non-recyclables.
- Waste recycling: at this stage, all recyclables' wastes will be collected and untied in research work within the campus or sold to recycles (includes papers and plastic containers). Degradable wastes will be utilized in existing research activities such as composting, biogas generation and maggot production. Staff collects a small amount of food waste as animal feed.
- The remaining non-decomposable and no recyclables will be stored on site in constructed chambers, before it is transported by Iringa municipal for final disposal.

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

6.10.6 Alternatives building materials

It is estimated that building materials account for more than 66% of the total building cost, therefore, the selection of affordable building materials is critical important. MUCE considered all these and looked into a variety of building materials for different aspects of the proposed buildings. Architects consulted with structural engineers on the load-bearing capabilities of available materials. Five common materials namely *concrete, steel, wood, masonry and stone* were considered as briefly described hereunder:

Concrete: Concrete is a composite material made from fine and coarse aggregates, bonded together with cement. Its versatility, cost and strength make it the ideal material for building foundations. It is most preferred since it can carry heavy load and withstand harsh environmental conditions.

Steel: Steel is a metal alloy of iron and carbon and often-other alloying material in its composition to make it stronger and more fracture-resistant than iron. Because it is so strong compared to its weight and size, structural engineers use it for the structural framework of tall modern buildings and large industrial facilities.

Wood: Among the oldest, or perhaps *the* oldest, of building materials, wood has been used for thousands of years and has properties that make it an ideal building material—even in the days of engineered and synthetic materials.

Stones: The longest lasting building material available is the one that's been here for thousands of years: stone. In fact, the most ancient of buildings still in existence in the world are made of stone.

Brick/masonry*:* Masonry construction uses individual units (such as bricks) to build structures that are usually bound together by some kind of mortar. The strongest and most commonly used masonry unit is a concrete block, which may be reinforced with steel. Glass, brick, and stone can all be used in a masonry structure.

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

6.10.7 Alternatives roofing materials

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

Conclusion: Although roofing tiles and concrete reinforced roof scored more points in terms of whether resistance, longevity and resistance to corrosion, they were found to be more expensive than aluminium roofing (i.e., per square meter). Aluminium roofing sheets scored more point on capital costs, flexibility and less labour-intensive during installation. Therefore, the University opted to use corrugates aluminium sheets for roofing.

CHAPTER 7: ENVIROMENTAL AND SOCIAL MANAGEMENT PLAN

7.1 Introduction

Mitigation measures are presented in the following Environmental and Social Management Plan (ESMP) that is to be implemented by MUCE and Contractor during mobilisation, construction, operation and decommissioning phases (Table 7.1). Plans for the implementation of mitigation measures for the proposed project are provided in this Chapter. The Plans indicate institutional responsibilities, time to take the action, monitoring frequency and estimated costs. The proposed costs are only indicative, should be used for the proposed development to proceed with the suggested changes; the developer will estimate actual costs and include them in the overall cost of the project. Based on the EMA, (URT 2004), NEMC is required to approve the ESMP.

7.2 Implementation of the Management Plan

The environmental and social mitigation measures should be incorporated in the detailed engineering design and shall be handed over to the contractor during construction period. The Contractor should take stock of the contents of the Environmental and Social Management Plan of the Project. The contractor shall implement the ESMP during the construction period under close supervision of MUCE Management.

During implementation, the MUCE Estate department shall be responsible for:

- Relocation of utility services and people is implemented and completed before the commencement of any construction works;
- Ensuring that MUCE staffs and students are aware of the project imp mentation schedules, especially where construction might affect normal routine;
- Ensuring that the implementation of the ESMP is part of the Contractor's contractual obligations. MUCE procurement entity will supervise the tendering process for all service providers;
- Ensuring that the ESMP is implemented and approval conditions are observed during the mobilization, construction and operation of the project.

During the Operation Phase, MUCE Management will manage the building and implement the ESMP. When the project reaches a stage of decommissioning, the MUCE shall prepare a decommissioning plan that will include environmental and social issues highlighted in the ESMP.

7.3 Environmental and Social Cost

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 MUCE shall cover all the costs proposed in the ESMP.

Table 7.1: Environmental and Social Management Plan

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
MOBILIZATION PHASE					
SOCIAL POSITIVE IMPACT					
1	Job Creation and Employment Opportunities	○ Employment of local consultants ○ The contractor shall be encouraged to employ local, unemployed yet willing to work hard manpower to the extent viable subject to a maximum of 50% unskilled labour. This will ensure that local people are more benefited out of the project. ○ 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 labour standards and regulations, providing a safe and supportive working environment for all employees ○ Employment opportunities to be offered based on merits and known interviewing procedures and grading systems. ○ Continuously monitor the impact of job creation initiatives, making adjustments as needed to address any challenges and maximize positive outcomes for the community. ○ Reasonable wages should be paid to both skilled and unskilled labourer to be employed by the project.	Contractor/ Consultants/ Project Implementation Team	Daily	N/A
2	Increased market opportunities and sources of income	○ 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.	Contractor/ Consultants/ Project Implementation Team	Daily	N/A

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		○ 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. ○ Foster collaboration between the project management and local community organizations. This can help identify potential suppliers and service providers, creating mutually beneficial relationships that contribute to the economic development of the community			
3	Increased Revenues to Local Authorities	○ Encourage the utilization of local businesses for supplies and services needed during the construction phase. This promotes economic growth within the community. ○ Local authorities can strategically plan and implement tax structures that ensure optimal revenue collection during the peak construction activities. This may involve revising tax rates on construction-related transactions and services ○ Promote local economic development projects that align with the construction activities to sustain economic transactions beyond the construction phase. ○ Encourage local businesses to provide goods and services required for the construction, fostering a symbiotic relationship.	LGA/ Contractor/ Consultants/ Project Implementation Team	Daily	N/A
NEGATIVE SOCIAL IMPACT					
4	Disruption of social activities	○ Contractor shall develop and implement a comprehensive traffic management plan to minimize disruptions along Pawaga and Mkwawa roads. This plan should include designated routes for construction	Contractor/ Consultants/ Project	Weekly	N/A

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		vehicles and scheduling deliveries during non-peak hours o Contractor shall conduct awareness programs for the local community, including food vendors, passengers, drivers, and students, to inform them about the upcoming disruptions. Provide information on alternative routes and timing to minimize inconvenience o Environmental and Social Specialists of MUCE should explore the possibility of temporarily relocating key services, such as food vendors or public transportation stops, to less affected areas during the mobilization phase. This can help maintain essential services without significant interruption o Establish effective communication channels between the construction team and the local community to address concerns and provide real-time updates on construction activities. This fosters transparency and community engagement o Coordinate with Ilala Primary School and Mkwawa Secondary School to adjust school schedules or routes, ensuring minimal disruption to students' daily routines. This could involve staggered start and end times or alternate transportation arrangements	Implementation Team		
5	Impact on Safety and Health risks	o Implement comprehensive training programs for workers to raise awareness about potential hazards and safe work practices o Enforce strict compliance with health and safety regulations to ensure the well-being of workers and the general public. o Regularly monitor and audit the site to confirm adherence to safety protocols o Mandate the use of appropriate PPE, such as helmets, gloves, and safety boots, to minimize the impact of potential accidents o Develop and communicate clear traffic management plans to minimize disruptions and risks associated with changes in traffic patterns during mobilization. o Implement temporary traffic control measures to ensure the safety of	LGA/ Contractor/ Consultants/ Project Implementation Team	Daily	15,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		both workers and local residents. o Install noise and dust control measures to mitigate the immediate risks posed to the safety and health of local residents. o Regularly monitor environmental conditions to identify and address any emerging hazards promptly. o Establish and communicate emergency response plans to address accidents or unforeseen incidents promptly. o Ensure that workers are adequately trained on emergency procedures to enhance preparedness.			
6	Increased Traffic and road accidents	o Contractor shall develop a comprehensive traffic management plan to regulate the flow of vehicles and minimize congestion during the mobilization phase. o Contractor should coordinate and schedule deliveries of building materials and equipment during off-peak hours to reduce the impact on regular traffic. o Implement reduced speed limits in construction zones and install clear signage to alert drivers about the presence of construction-related activities o Conduct public awareness campaigns to inform local residents, businesses, and commuters about the upcoming construction activities and potential traffic disruptions. o Work closely with local traffic authorities to monitor and manage traffic flow effectively, ensuring the safety of both construction personnel and the general public o Encourage and facilitate alternative transportation methods for construction workers to reduce the number of individual vehicles on the road. o Establish emergency response protocols to promptly address and manage any road accidents that may occur.	Contractor/ Consultants/ Project Implementation Team	Daily	10,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
NEGATIVE ENVIRONMENTAL IMPACT					
7	Loss of flora and fauna due to exploitation of borrow pits/quarries and other natural resources	○ Implement efficient resource management practices to minimize the extraction of building materials. ○ Ensure that building materials are sourced from legitimate and sustainable suppliers to prevent unauthorized exploitation of natural resources ○ Monitor and control water and energy use to minimize additional demands on these resources. ○ Explore alternative sources for building supplies to reduce the impact on local flora and fauna ○ Raise awareness among local communities about the importance of preserving natural resources and involve them in conservation efforts. ○ Ensure strict adherence to environmental regulations and guidelines to prevent overexploitation and degradation of natural resources	Contractor/ Consultants/ Project Implementation Team	Daily	N/A Part of its project
8	Contamination and /impaired quality of receiving body – land and water	○ Contractor shall develop and implement a comprehensive waste management plan to properly handle and dispose of construction waste, including cleared vegetation, topsoil, and domestic waste. ○ Introduction of waste disposal bins, warning notices, posted at strategic points. ○ No, on site burial or open burning of solid waste shall be permitted. ○ Wastes not suitable for incinerations and general municipal waste dumping (e.g., plastics, rubbers, tyres, etc.) shall be removed for recycling, treatment, and/or disposal by licensed contractor as appropriate; and ○ Instructions to contractor to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste during bidding process.	Contractor/ Consultants/ Project Implementation Team	Daily	10,000,000
9	Increased Air pollution and climate	○ Implement the use of cleaner fuels and advanced technologies for construction machinery and transportation to reduce emissions of CO2, NOx, and fine particulates	Contractor/ Consultants/ Project	Daily	8,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
	change	○ Prioritize the preservation of existing vegetation and implement a comprehensive tree planting program to offset the loss of trees during construction ○ Install and enforce effective emission control devices on diesel-powered trucks to minimize the release of pollutants into the air. ○ Optimize construction site management practices to minimize the duration and intensity of activities that contribute to air pollution, such as efficient scheduling and material storage ○ Conduct awareness campaigns for the local community and workers regarding the environmental impact of air pollution and climate change, promoting sustainable practices ○ Establish a comprehensive monitoring system to regularly assess air quality and emissions during construction. Report findings to relevant authorities and the community	Implementation Team		
CONSTRUCTION PHASE					
POSITIVE IMPACTS					
1	Jobs creation and Employment opportunities	○ Ensure that the contractor prioritizes the hiring of local residents, both skilled and non-skilled, from Mkwawa, Mtwivila, and Ilala wards. ○ Collaborate with local employment agencies to identify qualified candidates within the community. ○ Implement training programs to enhance the skills of the local workforce, enabling them to qualify for skilled positions and fostering long-term employability ○ Establish contractual agreements with the contractor to adhere to the employment targets, ensuring the stipulated number of skilled and non-skilled labourers are hired from the local community ○ Facilitate the growth of self-employment opportunities by encouraging the establishment of businesses such as restaurants and food vendors to meet the increased demand generated by the project ○ Encourage the contractor to contribute to community economic	Contractor/Environmental and Social Specialists of MUCE	Daily	N/A Part of its project

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		development initiatives, such as supporting local businesses and entrepreneurs, thereby fostering long-term economic resilience o Implement a monitoring and reporting system to track the employment impact throughout the construction phase, ensuring compliance with the outlined measures			
2	Increase income to local suppliers and service providers	o Contractor shall purchase raw materials from as many local suppliers. o Contractor shall hire local workers for various construction-related tasks, contributing to increased employment opportunities in Mkwawa, Mtwivila, and Ilala wards. o Provide training and support to local suppliers and service providers to enhance their capacity to meet the increased demand o Actively involve and engage local suppliers for construction materials needed during the establishment phase. o Provide training and support to local suppliers and service providers to enhance their capacity to meet the increased demand o Implement fair and transparent procurement processes to ensure that local suppliers have equal opportunities to participate in supplying materials and services for the project o Integrate environmentally sustainable practices in construction to minimize negative impacts on the local environment, ensuring long-term benefits for the community. o Maintain open and transparent communication with local suppliers and service providers to address any concerns and ensure that they are well-informed about project developments	Contractor/Environmental and Social Specialists of MUCE	Daily	N/A
3	Increased skills and impart knowledge to local communities	o Develop and implement structured training programs for both skilled and non-skilled labourers in the local communities. o Contractor shall provide on job skills and training. o Actively engage the local workforce in construction activities, providing hands-on experience with new equipment and technologies o Implement capacity building initiatives to equip individuals with	Contractor	Daily	N/A

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		essential skills required for their roles in the construction process o Establish a system for continuous monitoring and evaluation of the training programs to ensure their effectiveness o Involve local communities in the planning and execution of skill development initiatives to ensure relevance and sustainability. o Implement a monitoring and evaluation system to track the effectiveness of the skills transfer programs. o Regularly assess the impact on individuals and the community to make necessary adjustments for continuous improvement.			
NEGATIVE SOCIAL IMPACT					
4	Influx of people	o Enhance efforts to prioritize hiring from local communities (Mkwawa, Mtwivila, and Ilala wards) to minimize external migration for employment. o Implement skills training programs for the local population to enhance their employability and competitiveness for construction-related jobs o Organize job fairs and information sessions to ensure transparent communication about employment opportunities, reducing misinformation and speculation o Establish regular communication channels with the local communities to address concerns, provide updates, and gather feedback on employment-related issues o 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. o Implement monitoring mechanisms to ensure fair hiring practices and adherence to the preference for local employment, with penalties for non-compliance. o 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	Contractor/Environmental and Social Specialists of MUCE	Weekly	N/A

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
5	Food Insecurity and inflation of prices on other social services	○ Develop a comprehensive plan in collaboration with local communities to ensure sustainable food sources during the construction phase. ○ Strengthen local supply chains for food by working with local farmers and vendors to meet the increased demand. ○ Implement mechanisms to monitor and control the prices of essential goods, especially food items. ○ Conduct awareness campaigns to educate the community about the potential impacts on food prices and steps being taken to mitigate the situation ○ Ensure efficient construction management to complete the project within the stipulated timeframe, minimizing the duration of increased demand for resources	Contractor/Environmental and Social Specialists of MUCE	Monthly	N/A
6	Occupational Safety and Health impacts	○ Contractor should implement comprehensive and ongoing training programs for construction workers to increase awareness of potential hazards and safe work practices ○ Contractor should prepare C-ESMP ○ Contractor should have registered health and safety personnel ○ Strictly enforce and monitor adherence to safety protocols and guidelines throughout the construction process, with a focus on preventing accidents related to scaffold failures, electrocutions, falls, defective machinery, and exposure to harmful materials ○ Conduct regular inspections of construction equipment, machinery, and scaffolding to ensure they meet safety standards and are in good working condition ○ Implement measures to control air pollution on-site, such as the use of dust control systems, proper waste disposal, and the restriction of harmful emissions from construction activities ○ Mandate the use of appropriate PPE, including helmets, safety harnesses, gloves, and masks, to minimize the risk of injuries and exposure to pollutants	Contractor/Environmental and Social Specialists of MUCE	Daily	20,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		○ Establish health monitoring programs for construction workers to detect and address potential health issues arising from prolonged exposure to construction-related pollutants ○ Engage with the local community to raise awareness of the construction activities, potential risks, and safety measures in place, fostering a collaborative approach to safety ○ Contractor shall ensure that the construction site is barricaded and hygienically kept with adequate provision of facilities including waste disposal receptacles, firefighting and clean and safe water supply; ○ Foster a safety-first culture within the construction project by promoting a collective responsibility for safety among all stakeholders, including workers, contractors, and project management ○ A well-stocked First Aid kit (administered by medical personnel/ First Aider) shall be maintained at 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;			
7	Community Health, Safety and Security impacts	○ Implement strict access control measures at construction sites and labour camps to regulate the movement of workers and identify potential security threats. ○ Collaborate with local law enforcement to enhance security in the surrounding areas during construction. ○ Develop and enforce comprehensive health and safety protocols, including regular health screenings for workers, to mitigate the risk of communicable diseases like COVID-19 and HIV/AIDS. ○ Provide training programs for workers on health and safety practices to minimize the spread of diseases. ○ Establish community engagement programs to address concerns related to increased local prices, crime, prostitution, and alcohol abuse. These programs can include awareness campaigns, counseling services, and	Contractor/Environmental and Social Specialists of MUCE	Daily	20,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		community forums. o Implement traffic management plans to minimize road accident risks associated with increased construction-related traffic. This includes regulating the movement of trucks and construction equipment and providing proper signage. o Designate specific areas for construction activities within the university campus to minimize social interactions between construction workers and the local community. o Collaborate with healthcare providers to establish health clinics within the university to address potential health issues arising from increased social interactions. o Regularly monitor and assess the impact of construction activities on community health, safety, and security. o Adapt mitigation measures based on ongoing assessments to address emerging issues and concerns			
8	Conflicts and grievances	o Conduct workshops and awareness programs for construction workers on cultural norms and local sensitivities, emphasizing respectful behaviour towards married women and school children. o The project will prepare a GBV Action Plan that ensures project awareness raising strategy (for workers and community members), a list of GBV service Providers to which GBV survivors will be referred, revisions to the GRM to ensure it can address GBV complaints, and information on GBV allegation procedures in the workplace. o Implement a structured grievance resolution mechanism that allows local community members to express concerns related to construction activities. This mechanism should ensure prompt and fair resolution of issues o Implement effective dust control measures, such as water spraying and covering construction materials, to minimize the impact on the local environment and address concerns about dust and flying stones	Contractor/Environmental and Social Specialists of MUCE	Daily	2,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		○ Organize regular meetings between construction project representatives and the local community to discuss ongoing activities, address concerns, and foster open communication ○ Appoint a dedicated community liaison officer who serves as a point of contact between the construction team and the local community, facilitating communication and addressing grievances promptly ○ Ensure timely and transparent communication about the construction schedule, potential disruptions, and any necessary adjustments to minimize surprises and conflicts ○ Implement regular monitoring of construction activities to ensure adherence to guidelines and regulations, with penalties for non-compliance, thereby promoting responsible conduct among construction workers.			
9	Gender Discrimination	○ Implement policies to ensure equal employment opportunities for both men and women in the construction workforce. ○ Provide training and awareness programs to promote gender equality among contractors and workers. ○ Establish and enforce strict anti-sexual harassment policies on construction sites. ○ Display clear and visible posters on reporting channels at the respective construction offices. ○ Develop a Sexual Harassment Policy before start of the construction and its contents distributed and disseminated to all workers ○ Conduct regular workshops and training sessions to educate workers about appropriate behaviour and reporting mechanisms ○ Engage with the local community, particularly women and girls, to understand their needs and concerns. ○ Implement programs that empower women through skill development, education, and entrepreneurship opportunities ○ Provide access to psychological support services for individuals affected	Contractor/Environmental and Social Specialists of MUCE	Daily	2,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		by gender discrimination, including counselling and mental health resources. o Collaborate with local organizations to address the psychological impact on women and girls in the community o Provide access to psychological support services for individuals affected by gender discrimination, including counselling and mental health resources. o Collaborate with local organizations to address the psychological impact on women and girls in the community o Provide access to psychological support services for individuals affected by gender discrimination, including counselling and mental health resources. o Collaborate with local organizations to address the psychological impact on women and girls in the community o Partner with local non-governmental organizations (NGOs) and advocacy groups that focus on gender equality to leverage expertise and resources			
10	Prevalence of Communicable diseases	o Prepare and implement comprehensive health education programs targeting construction workers, students and local communities. These programs should focus on raising awareness about the risks of engaging in unprotected sexual activities and promote safe practices o Provide easy access to free or affordable condoms on the construction site and within the local communities to encourage safe sexual practices and reduce the risk of STDs, including HIV/AIDS. o Establish regular health screening programs for construction workers to detect and address any potential communicable diseases early. This can include HIV testing, counselling, and access to medical care. o Foster community involvement in promoting health awareness and responsible behaviour. Engage community leaders to support initiatives that discourage risky behaviours and emphasize the importance of health	Contractor/Environmental and Social Specialists of MUCE	Daily	3,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		in the long term. o Implement campaigns to reduce the stigma associated with HIV/AIDS and other communicable diseases. This can help create a supportive environment for affected individuals to seek testing and treatment without fear of discrimination. o Increase security measures to discourage the influx of sex workers to the construction area. This may involve collaboration with local law enforcement to maintain a safe and secure environment.			
11	Insecurity and theft	o Deploy trained security personnel to monitor the construction site, deterring potential thieves and enhancing overall security. o Install surveillance cameras strategically across the construction site to monitor activities and provide evidence in case of theft or security incidents o Implement strict access control measures, limiting entry points and ensuring that only authorized personnel have access to the construction site. o Install adequate lighting around the construction site to minimize areas of darkness, reducing the likelihood of unauthorized access and theft. o Foster a positive relationship with the local communities by involving them in the construction process, creating a sense of ownership and reducing the likelihood of theft. o Establish secure storage facilities for construction materials and equipment, ensuring they are locked and well-protected when not in use. o Conduct regular security audits to identify vulnerabilities and make necessary improvements to the security infrastructure	Contractor	Daily	N/A Parts of its project
12	Child labour	o Establish and enforce a comprehensive Labour Management Plan that explicitly prohibits the employment or engagement of individuals under the age of 18 in any project-related activities. o Conduct regular and thorough monitoring and audits to ensure compliance with the Labour Management Plan, with a specific focus on	Contractor/Environmental and Social Specialists of MUCE	Daily	N/A Part of its project

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		preventing child labour. o Implement awareness programs within the local communities, emphasizing the importance of preventing child labour and encouraging community members to report any instances. o Provide training for project personnel on identifying and addressing child labour issues, emphasizing the legal and ethical considerations associated with child labour o Collaborate with local authorities to strengthen regulatory oversight and ensure that child labour laws and regulations are strictly enforced. o Implement social support programs to address the socio-economic factors that may contribute to child labour, providing alternative opportunities for families and ensuring access to education for children. o Establish a transparent reporting mechanism for workers and community members to report any suspected cases of child labour without fear of retaliation. o Include clauses in contracts with suppliers and contractors, requiring them to adhere to the prohibition of child labour and verifying their compliance through regular assessments.			
NEGATIVE ENVIRONMENTAL IMPACTS					
13	Impairment of air quality due to dust and ambient pollutant emission	o Implement effective dust suppression techniques, such as using water sprays or dust suppressants on construction sites to minimize the release of fugitive dust. o Prioritize the preservation of existing vegetation during construction to reduce the need for extensive clearance, minimizing the disturbance that contributes to dust emission. o Cover sand and aggregate stockpiles to prevent wind erosion and reduce the dispersion of particulate matter into the air. o Opt for construction practices that minimize soil disturbance and dust generation, such as limiting heavy machinery movement. o Provide workers with appropriate PPE, including masks and respiratory	Contractor	Daily	10,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		protection, to safeguard their health against potential exposure to airborne particulate matter. o 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. o Establish a monitoring system to regularly assess air quality during construction, ensuring that concentrations of PM2.5 and PM10 remain within acceptable limits. o Develop a responsive action plan to promptly address any exceedance of emission limits or unexpected air quality issues, ensuring a proactive approach to mitigation.			
14	Impact on climate change	o Implement the use of renewable and cleaner energy sources for construction equipment to minimize the emission of greenhouse gases. This could involve using electric or hybrid machinery powered by sustainable energy. o Install and enforce the use of emission control technologies on fuel-powered equipment to reduce the release of carbon dioxide and noxious gases into the atmosphere during construction activities. o Optimize construction practices to minimize the overall carbon footprint, such as efficient waste management, recycling of materials, and reducing energy-intensive processes where possible o Raise awareness among local residents in Mkwawa, Mtwivila, and Ilala wards about the potential impacts of construction on climate change. Engage with the community to foster understanding and support for sustainable construction practices. o Adhere to green building standards and certifications that promote environmentally friendly construction practices. This includes designing and constructing buildings that are energy-efficient and have minimal environmental impact. o Implement a robust monitoring system to track and report greenhouse	Contractor/Environmental and Social Specialists of MUCE	Daily	N/A Parts of its project

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		gas emissions during construction. This will help in identifying areas for improvement and ensuring compliance with emission reduction measures. o Ensure strict adherence to local environmental regulations and standards governing construction activities. Regular inspections and enforcement measures can help prevent excessive emissions and promote responsible construction practices. o Plan for post-construction rehabilitation efforts to offset any environmental impact caused during the construction phase. This could involve planting trees, restoring natural habitats, or other measures to enhance the local environment.			
15	Increased Noise level	o Implement construction activities during specific time windows to minimize disruption during sensitive hours, such as early mornings or late evenings when community activities are at a minimum. o Install temporary acoustic barriers or soundproofing measures around noisy machinery and construction sites to contain and reduce the propagation of noise. o Ensure that all construction equipment undergoes regular maintenance to reduce noise emissions. Well-maintained machinery tends to operate more quietly. o Providing ear protection materials for the workers in noisy area. o Proactively communicate construction schedules and potential noise impacts to the local community. Seek feedback and address concerns to foster understanding and cooperation o Provide training to construction workers on the importance of minimizing noise pollution and adopting practices that contribute to a quieter working environment	Contractor	Daily	5,000,000
16	Increased vibration	o Explore and implement advanced construction techniques that minimize vibrations. This may include the use of specialized equipment designed to reduce ground vibrations during activities like blasting and impact	Contractor	Quarterly	2,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		pile driving. o Establish effective communication channels with the local community to provide timely information about construction schedules and activities that may cause vibrations. This helps residents to take necessary precautions and prepares them for potential disruptions. o Install vibration monitoring devices in key locations to continuously monitor ground vibrations during construction. This real-time data can be used to assess the impact and adjust construction methods accordingly to stay within acceptable limits o Modify construction methods to minimize vibration generation. For example, consider alternative pile driving techniques or adjust blasting procedures to reduce the intensity of vibrations o Foster an open dialogue with the local community to address concerns and gather feedback. This engagement can help in refining mitigation measures based on community input and building a collaborative approach to managing the impact			
17	Generations of Solid and Hazardous Wastes	o Implement a comprehensive waste segregation system to separate recyclable materials from hazardous and non-biodegradable waste o Adhere to proper disposal methods for hazardous substances and materials, following established guidelines and regulations. o Employ certified waste disposal services to ensure safe handling of hazardous waste o Conduct awareness campaigns for workers and local communities on the importance of proper waste management and its environmental implications. o Provide training to construction personnel on handling and disposing of different types of waste responsibly. o Topsoil shall be stock piled and used for reclamation or re-vegetation at the site during landscaping. o Implement regular environmental monitoring to track the impact of	Contractor	Weekly	1,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		waste generation during construction. o Use this data to adjust waste management strategies and improve practices if necessary o Involve local communities in waste management initiatives, encouraging their participation in recycling programs and responsible disposal practices. o Seek feedback from residents to address any concerns related to waste management.			
18	Generations of Liquid Wastes	o Enforce and adhere to best practices in waste management to ensure that all liquid wastes are handled and disposed of in an environmentally responsible manner, minimizing health risks and pollution o Conduct awareness programs for the local community in Mkwawa, Mtwivila, and Ilala wards, educating residents about the importance of proper waste disposal and its impact on health and the environment. o Contractor shall be instructed to put in place acceptable procedure for handling hazardous waste such as oils, lubricants and non-combustible waste. o Wastewater will be discharged directly to the public sewer system. o Establish a monitoring system to regularly assess the effectiveness of waste management practices during construction. Enforce strict compliance measures to ensure that all generated liquid wastes are treated and disposed of according to established standards. o Collaborate with local environmental regulatory authorities to ensure that the construction activities comply with existing regulations and standards for waste management. o Develop and implement an emergency response plan to address any unforeseen incidents or spills during the construction phase, minimizing the potential for long-term environmental damage. o Explore opportunities for reusing or recycling treated water where applicable, reducing the overall volume of liquid waste generated and	Contractor/Environmental and Social Specialists of MUCE	Weekly	1,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		promoting sustainable water management practices.			
19	Loss of flora (vegetation) and fauna	○ Implement a comprehensive plan for revegetation and reforestation in and around the construction site to restore the indigenous flora. ○ Integrate green construction practices to minimize the need for extensive clearing of natural vegetation. ○ Explore alternative construction methods that reduce the ecological footprint. ○ Close supervision of earthworks shall be observed in order to confine land clearance within the project site. ○ Implement erosion control measures, such as the installation of sedimentation barriers and erosion control blankets, to prevent soil erosion from wind and water. ○ Establish a biodiversity 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 biodiversity and the ongoing mitigation measures. ○ Regularly review and update the environmental management plan based on monitoring and feedback.	Contractor/Environmental and Social Specialists of MUCE	Quarterly monitoring and Verification Report	N/A Part of its project cost
20	Impact on natural resource (Energy and water)	○ Promote the use of renewable energy sources, such as solar or wind power, to reduce reliance on fossil fuels. Optimize machinery and vehicle operations to minimize fuel consumption. ○ Implement recycling and reuse systems for water used in construction activities. Utilize alternative water sources, such as rainwater harvesting, to reduce dependency on municipal water. ○ Establish a comprehensive monitoring system to track energy and water usage throughout the construction phase ○ Conduct awareness campaigns to educate the local community about the importance of resource conservation during construction ○ Implement strict regulations and guidelines to ensure responsible	Contractor/Environmental and Social Specialists of MUCE	Quarterly monitoring and Verification Report	3,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		resource management. Regularly assess and audit resource consumption to identify areas for improvement. o Ensure that the construction complies with environmentally friendly building standards. Implement rainwater harvesting, energy-efficient lighting, and insulation to reduce overall resource impact			
21	Erosion of Exposed Surfaces	o Implement thorough compaction and resurfacing techniques during construction to minimize exposed surfaces prone to erosion. o Introduce erosion control measures such as the use of erosion control blankets, sediment barriers, and vegetative cover to reduce the impact of rain, trampling, and vegetation clearance. o Construction will be done as per engineering design and procedure of which a maximum requirement of compaction strength is achieved during the construction. That is maximum dry density (MDD) specified in the design manual by consultant. o Maintain gravel fill and/or re-vegetate around the structures. o Plan construction activities considering weather conditions to avoid exacerbating erosion during periods of heavy rainfall. o Most of construction activities will be done during dry weather. o Most of construction activities will be done during dry weather. o Implement measures to protect local resources during construction to minimize disruptions to the communities. o Establish a monitoring system to track erosion control measures and enforce compliance with construction guidelines to prevent excessive sedimentation in runoffs. o Develop plans for post-construction restoration, including replanting vegetation and rehabilitating affected areas to promote ecosystem recovery.	Contractor	Quarterly monitoring and Verification Report	N/A Part of its project cost
22	Loss of Visual Aesthetics	o 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.	Contractor	Quarterly monitoring	2,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		○ Implement visual barriers such as construction fences, temporary screens, or artistic panels to shield construction activities from direct view. This will minimize the visual intrusion experienced by residents ○ Enforce strict construction schedules to limit noisy and visually disruptive activities to specific hours, reducing the impact on the community during peak times. ○ Foster open communication with the local community to gather feedback and address concerns related to visual changes. This involvement can help tailor mitigation efforts to meet community expectations. ○ If night time construction is necessary, use low-impact lighting to minimize light pollution. Shielding and directing lights away from residential areas will preserve the night sky's visual quality. ○ Develop comprehensive plans for the post-construction period, including the restoration of altered landscapes. This may involve replanting native vegetation and restoring natural features to enhance the visual aesthetics			
DEMOBILIZATION PHASE					
NEGATIVE IMPACTS					
1	Loss of employment	○ Implement skill development programs to enhance the employability of the affected workers. ○ Provide training in areas with high demand in the local job market. ○ Informing workers, the project duration when employing them ○ Establish job placement services to assist displaced workers in finding alternative employment opportunities. ○ Educating the labour force on the need to save part of their wages. ○ Paying severance benefit to all laid off workers according to the provision of the labour laws. ○ Establish community support programs to provide financial assistance or counselling services to those facing immediate economic challenges.	Contractor/Environmental and Social Specialists of MUCE	Quarterly monitoring and Verification Report	N/A Part of its project cost

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
2	Loss of business opportunities	○ Offer training programs to local traders and entrepreneurs to diversify their products and services. This can help them adapt to changing circumstances and explore alternative business opportunities beyond construction-related activities ○ Establish clear communication channels between the construction project management and local businesses. This ensures that businesses are informed about the project timeline, allowing them to plan for potential disruptions and adjust their operations accordingly. ○ Encourage collaboration among local businesses to create a network that can collectively address challenges and explore new business opportunities. This can foster resilience and community support ○ Facilitate the establishment of support services for construction workers, such as designated areas for purchasing food from local entrepreneurs. This ensures that some business activities can continue despite the temporary disruptions. ○ Advocate for and facilitate access to government assistance programs for affected businesses. This could include tax relief, low-interest loans, or other financial support measures. ○ Work with local authorities and businesses to develop long-term plans for economic resilience, considering potential future construction projects and identifying strategies to minimize the impact on local businesses.	Contractor/Environmental and Social Specialists of MUCE	Quarterly monitoring and Verification Report	N/A
3	Dust and noise pollution from demolishing works	○ Employ dust control technologies such as water spraying systems to minimize the release of dust particles during demolition activities. This will help maintain better air quality ○ Implement noise reduction strategies, including the use of sound barriers, noise-dampening equipment, and scheduling noisy activities during specific times to minimize disruption to nearby residents. ○ Provide workers with personal protective equipment (PPE) such as masks and ear protection to mitigate health risks associated with dust	Contractor/Environmental and Social Specialists of MUCE	Daily	6,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		inhalation and prolonged exposure to high noise levels o Conduct awareness programs for local residents, informing them about the demolition schedule, potential impacts, and measures being taken to mitigate dust and noise pollution. This foster understanding and cooperation o Establish a monitoring system to regularly assess air quality and noise levels. Implement a reporting mechanism to promptly address any deviations from acceptable standards, allowing for quick corrective actions o Explore and utilize demolition methods that generate less dust and noise, such as mechanical methods that are more controlled and produce fewer airborne particles.			
OPERATIONAL AND MAINTANANCE PHASE					
POSITIVE SOCIAL IMPACTS					
1	Increase of admission of students to MUCE	o Gender and disadvantaged groups will be considered during the student's selection process o MU shall increase advertisement to attract more students to study the priority programmes for the Nation	Environmental and Social Specialists of MUCE	Annual	N/A
2	Increase of revenue to MUCE	o Innovate business activities linked with academic activities for enhancing income of the University o Implement robust financial management practices to ensure that the increased revenue is allocated efficiently and effectively. o Establish financial reserves for unforeseen circumstances and to secure the long-term financial stability of MUCE o Develop a comprehensive risk management plan to identify and mitigate potential risks that could impact the financial stability and success of MUCE o Implement a robust monitoring and evaluation system to track the outcomes and impacts of the new buildings and other initiatives o Develop and expand online education programs to reach a wider	Environmental and Social Specialists of MUCE	Daily	N/A

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		audience and attract students from different geographic locations.			
3	Job creation and employment opportunities	○ Implement skill development programs and training initiatives to enhance the employability of local residents. This could include vocational training in areas relevant to the institution's operations, such as hospitality, agriculture, and business management ○ Prioritize the hiring of local residents for various positions within the institution. This can be facilitated through collaboration with local employment agencies or community outreach programs to connect potential employees with job opportunities ○ Foster partnerships with local businesses in the cleanliness, stationery, catering, and commercial sectors to ensure a mutually beneficial relationship. This can stimulate economic growth in the community and create additional job opportunities ○ Establish initiatives or support existing programs that promote entrepreneurship within the community. This could involve providing mentorship, or resources to aspiring entrepreneurs, thereby creating new businesses and job opportunities ○ Engage with the local community through regular communication channels to inform them about job opportunities, skill development programs, and other initiatives. Educate the community on the long-term benefits of the institution and how they can actively participate in and benefit from its operations.	Environmental and Social Specialists of MUCE	Quarterly	N/A
4	Increased commercial and social activities around project locations	○ Establish platforms for ongoing dialogue between the university and local businesses to understand their needs and concerns ○ Offer training programs and workshops to local residents to enhance their skills and make them more employable in the growing market. ○ Collaborate with local vocational institutions to provide specialized training in areas related to the services and goods in demand ○ Organize cultural and social events on the university campus that attract residents from the surrounding areas, fostering a sense of community	Social Specialists of MUCE	Quarterly	N/A

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		and promoting local businesses. o Develop and implement policies that prioritize the procurement of goods and services from local businesses, thereby supporting the local economy.			
5	Government revenue collection and economic growth	o The project will allocate a portion of its generated revenue to various governmental regulatory authorities such as the NEMC, IRUWASA, TANESCO, FIRE and Rescue Force, and OSHA. This financial support will enable these authorities to carry out their functions effectively and contribute to overall regional development. o Local authorities should identify the new sources of revenue in the area. o Strengthening revenue collection mechanisms. o Awareness creation for the people in the area on the importance of paying revenues.	Social Specialists of MUCE	Quarterly	N/A
6	Growth of Trade and Increased Investment around MUCE	o Sensitize the community to invest to accommodate business opportunities inclined by the increasing students' enrolment.	Social Specialists of MUCE	Quarterly	N/A
7	Production of skilled labour force for implementing various development policies, plans and goals for sustainable	o The project aims to boost student enrolment, indicating a proactive approach to meet the growing demand for skilled professionals in alignment with national development policies. o MUCE is committed to providing high-quality education to its students, ensuring that graduates possess the necessary skills and knowledge to contribute effectively to the nation's development goals o The project emphasizes aligning its curriculum and training programs with the priorities outlined in national development policies. This ensures that graduates are well-prepared to address the specific needs and challenges of the country. o MUCE recognizes its crucial role in supporting Tanzania's	Social Specialists of MUCE	Quarterly	N/A

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
	social and economic growth of the Nation	industrialization efforts. By tailoring its educational programs to meet the demands of the labour market, the institution directly contributes to the development of a skilled workforce that can drive economic growth in the industrial sector			
8	The growth of banking activities in the project area	○ The project anticipates a surge in banking institutions establishing offices in the area. This growth is attributed to the overall expansion of banking activities driven by factors such as population growth, increased investments, and heightened trading activities ○ Factors like the rise in student enrolment at MUCE, the creation of employment opportunities, and increased income for residents and workers are expected to contribute to the circulation of funds in the local economy. This, in turn, makes the area more attractive for additional banking institutions. ○ The expectation is that both skilled and unskilled employees at MUCE will receive their payments through the banking system. This integration of the payment system is likely to further incentivize banks to operate in the area	Social Specialists of MUCE	Quarterly	N/A
NEGATIVE SOCIAL IMPACTS					
9	Increased incidences of diseases and ill health	○ Implement proactive health interventions during and after the project to address the specific health concerns of the local communities. This may include vaccination programs, health education, and access to healthcare services. ○ A safety, health and environment induction course shall be conducted to all students and workers, putting more emphasis on HIV/AIDS, which has become a national disaster as well as other emerging pandemics such as COVID 19 and dengue fever. ○ The project shall include information education and communication component (IEC) in its budget. This will help to raise more awareness on HIV/AIDS, and means to suppress its incidence. ○ Introduce preventive measures to reduce the likelihood of disease	Environmental and Social Specialists of MUCE	Quarterly monitoring	N/A Part of its project cost

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		transmission. This could involve promoting hygiene practices, ensuring clean water and sanitation facilities, and establishing protocols for waste disposal to minimize environmental health risks. o Engage with local communities to raise awareness about the importance of health and hygiene. Encourage community participation in health programs and empower them to take ownership of their well-being. o Establish a robust system for monitoring and surveillance of health conditions in the affected areas. This includes early detection of potential outbreaks, tracking disease trends, and implementing timely responses. o Collaborate with local health authorities and organizations to leverage their expertise and resources. This partnership can enhance the effectiveness of health interventions and ensure a coordinated response to health challenges. o Develop and implement emergency response plans to handle any sudden increases in disease incidences. This includes having protocols in place for rapid deployment of medical teams and resources in the event of an outbreak.			
10	Increased pressure on social services and utilities	o Implementing strategic plans for the expansion and improvement of local infrastructure, such as health facilities, places of worship, water supply, and electricity. This may involve constructing new facilities and upgrading existing ones to accommodate the growing population o Investing in training and capacity building programs for local service providers to enhance their ability to cope with increased demand. This could involve training healthcare professionals, utility workers, and other service providers to efficiently manage the rising needs of the community. o Conducting outreach programs to involve the local community in the planning and implementation process. This engagement helps in identifying specific needs and concerns of the community, ensuring that	Environmental and Social Specialists of MUCE	Quarterly	N/A Part of its project cost

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		the development initiatives are culturally sensitive and well-received. o Implementing employment generation programs that focus on local hiring. By prioritizing the employment of local residents, the impact on housing, transportation, and other services can be mitigated, reducing the strain on social services. o Implementing measures to optimize the use of resources, such as energy-efficient technologies and water conservation practices. This can contribute to reducing the overall demand on utilities, making them more sustainable in the face of increased pressure. o Establishing strong partnerships with local government authorities to jointly plan and implement infrastructure projects. This collaboration ensures that the development aligns with the overall growth strategy of the area and leverages available resources efficiently. Extraction of underground water resources;			
11	Increased level of crimes	o Increase the presence of law enforcement and security personnel in the affected areas. o Implement advanced surveillance systems and technologies to monitor and respond to criminal activities. o Establish community policing programs to foster collaboration between law enforcement and local residents. o Develop and implement community outreach programs to raise awareness about crime prevention strategies. o Encourage community members to actively participate in crime prevention through neighbourhood watch programs. o Conduct regular awareness campaigns to educate residents about the potential risks and how to protect themselves o Strengthen partnerships with local government agencies, community leaders, and NGOs to create a coordinated response to crime. And establish communication channels for sharing information and coordinating efforts to address security concerns.	Environmental and Social Specialists of MUCE	Daily	2,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		○ Introduce social programs and initiatives aimed at addressing the root causes of crime, such as unemployment, poverty, and lack of educational opportunities. ○ Support community development projects that contribute to a positive and inclusive social environment			
12	Incidence of Gender Based Violence	○ The project will prepare a GBV Action Plan that ensures project awareness raising strategy (for workers and community members), a list of GBV service Providers to which GBV survivors will be referred, revisions to the GRM to ensure it can address GBV complaints, and information on GBV allegation procedures in the workplace. ○ Implement comprehensive awareness programs within Mkwawa, Mtwivila, and Ilala wards to educate residents about the importance of gender equality, consent, and the prevention of GBV. ○ Promote community dialogues to address cultural norms contributing to GBV and encourage positive behavioural changes ○ Establish and enforce clear institutional policies at MUCE to prevent and address GBV among students and staff. ○ Provide support services such as counselling and helplines within MUCE to assist those affected by GBV. ○ Conduct training sessions for MUCE students and staff on recognizing and responding to signs of GBV. ○ Equip community leaders and relevant stakeholders with the skills to identify and address GBV issues effectively. ○ Create safe spaces within MUCE and the surrounding community where individuals can seek refuge and support. ○ Implement security measures to enhance the safety of students and residents, particularly during vulnerable times. ○ Establish a robust monitoring and evaluation system to track the effectiveness of interventions in reducing GBV. ○ Regularly assess the incidence of GBV and adjust strategies accordingly	Social Specialists of MUCE	Daily	N/A Part of its project cost

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		to address emerging challenges. o Collaborate with local authorities and law enforcement to ensure a swift response to reported cases of GBV. Also, foster partnerships with local organizations working on GBV prevention to leverage resources and expertise o Empower students with the knowledge and skills to advocate against GBV and contribute to a safer community. o Support community-led initiatives that empower individuals, especially women, to challenge and overcome GBV			
13	Disruption of traffic flow	o Establish a partnership with the local government and road management authority to jointly address traffic concerns. This collaboration is essential for effective coordination and implementation of traffic management solutions o Develop a comprehensive traffic management plan that considers the anticipated increase in vehicular and non-motorized traffic during the operational phase. This plan should outline specific measures to mitigate congestion and enhance safety in the surrounding areas. o Strategically place additional signboards to guide and inform road users about the changes in traffic patterns, entrances, and other relevant information. Clear signage can help prevent confusion and improve overall traffic flow. o Implement coordinated traffic control measures to optimize the flow of vehicles and ensure smooth operation near university entrances. This may involve the deployment of traffic personnel during peak hours or special events to manage the increased traffic. o Launch a public awareness campaign to inform the community, including students, faculty, and local residents, about the expected changes in traffic conditions. This could include distributing informational materials, organizing workshops, and using digital platforms to educate the public.	Environmental and Social Specialists of MUCE	Daily	2,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		○ Explore the use of technology, such as smart traffic lights or traffic monitoring systems, to enhance traffic flow efficiency. These solutions can be integrated with the existing infrastructure to dynamically manage traffic based on real-time conditions. ○ Establish a feedback mechanism for the community to report any issues related to traffic disruption. This allows for continuous monitoring and adjustment of the traffic management plan based on feedback from the users.			
14	Increased Water Demand	○ Install water conserving taps that turn- off automatically when water is not in use. ○ Encourage water reuse/recycling during occupation phases. ○ Roof catchments of building blocks should be provided with rainwater harvesting systems (gutters, down pipes and water storage facilities) to enhance collection and storage of the resulting run-off. Such water can be used in watering flower gardens, general cleaning etc. ○ Implement comprehensive water resource management strategies to ensure sustainable use. ○ Monitor water sources regularly to assess the impact on local water availability. ○ Promote water-efficient technologies and practices within the establishment to minimize consumption. ○ Implement water conservation measures such as rainwater harvesting and reuse/recycling ○ Conduct awareness programs to educate local communities about responsible water usage. ○ Involve local communities in the planning and implementation of water management initiatives. ○ Establish a robust monitoring and reporting system to track water usage, community impacts, and the effectiveness of mitigation measures. And share regular updates with stakeholders and the public to maintain	Environmental and Social Specialists of MUCE	Monthly	N/A Part of its project cost

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		transparency.			
15	Increased Energy Demand	○ Put off all lights immediately when not in use or are not needed. ○ Use energy conserving electric lamps for general lighting. ○ Integrate energy-efficient technologies and equipment in laboratory operations, focusing on reducing energy consumption without compromising functionality. ○ Implement advanced climate control systems that optimize heating, ventilation, and air conditioning (HVAC) to ensure energy is used more efficiently, adapting to specific needs and usage patterns ○ Replace traditional lighting systems with energy-efficient LED lighting and incorporate motion sensors to automatically control lighting based on occupancy, reducing unnecessary energy consumption. ○ Invest in renewable energy sources, such as solar panels or wind turbines, to supplement the energy demand and decrease reliance on traditional, carbon-intensive sources. ○ Conduct awareness programs to educate staff on energy conservation practices, encouraging them to adopt behaviours that contribute to energy efficiency in their daily operations. ○ Implement protocols and procedures to enhance operational efficiency, minimizing idle time for equipment and ensuring that energy-intensive processes are streamlined for maximum productivity. ○ Conduct regular energy audits to identify areas of improvement and track energy performance over time. This will help refine energy-saving strategies and address any emerging issues promptly. ○ Engage with local energy providers to explore collaborative measures, such as demand-response programs or incentives for adopting energy-efficient practices.	Environmental and Social Specialists of MUCE	Daily	N/A Part of its project cost
NEGATIVE ENVIRONMENTAL IMPACTS					
16	Increased water	○ Upgrade the laboratory wastewater containment systems to prevent the discharge of hazardous liquid waste into the municipal public sewer	Environmental and Social	Quarterly	4,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
	pollution	system. o Implement advanced treatment technologies to ensure that wastewater, especially from laboratories, undergoes proper treatment before being released o Establish a robust monitoring system to regularly assess the quality of wastewater discharged from MUCE facilities. o Implement strict compliance measures to ensure that the hazardous liquid waste meets acceptable environmental standards before disposal o Conduct educational programs within MUCE to raise awareness among laboratory staff and students about the potential environmental impact of improper wastewater disposal. o Promote responsible laboratory practices and waste management to reduce the generation of hazardous liquid waste o Collaborate with local communities in Mkwawa, Mtwivila, and Ilala wards to create awareness about the environmental consequences of water pollution. And involve community members in monitoring activities and reporting any observed anomalies in water quality o Develop and implement emergency response plans to address any accidental spills or releases of hazardous substances into the wastewater system. o Conduct regular drills to ensure that MUCE staff is well-prepared to respond to emergencies promptly.	Specialists of MUCE		
17	Health and safety risks due to fire hazards	o Conduct thorough inspections of electrical systems to identify and rectify potential faults before they lead to fire incidents. o Install fire-resistant wiring and use circuit breakers to mitigate the risk of electrical faults. o Utilize non-combustible or fire-resistant materials in critical areas, especially in laboratories and training workshops. o Implement strict construction practices that adhere to safety standards, ensuring that the risk of fire is minimized during the building process	Environmental and Social Specialists of MUCE	Daily	5,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		○ Provide comprehensive fire safety training to all personnel working in the new buildings, with a focus on proper handling of equipment, chemicals, and emergency evacuation procedures. ○ Conduct regular fire drills to ensure that everyone is familiar with the evacuation routes and emergency protocols ○ Install state-of-the-art fire detection systems, including smoke detectors and fire alarms, to ensure early identification of potential fire incidents. ○ Implement an effective fire suppression system, such as sprinklers, to control and extinguish fires in their early stages ○ Establish strict protocols for the storage and handling of chemicals in laboratories, minimizing the risk of chemical-related fire outbreaks. ○ Ensure that all personnel are trained in proper chemical storage and emergency response procedures ○ Implement a monitoring system to continuously assess fire risks during the operational phase. ○ Employ surveillance cameras in critical areas to enhance the early detection of potential fire hazards.			
18	Storm water generation and overflow	○ Implementing a comprehensive stormwater management system to capture, detain, and treat runoff. ○ Installing permeable pavements to promote infiltration and reduce runoff. ○ Constructing retention and detention basins to temporarily store stormwater and control the release of runoff into the drainage system ○ Incorporating vegetative swales and buffer strips to slow down and filter stormwater, promoting natural infiltration and reducing soil erosion ○ Utilizing green roofs on buildings to absorb and slow stormwater runoff, reducing the volume and velocity of water entering the drainage system ○ Conducting public awareness campaigns and educational programs to inform local communities, MUCE students, and stakeholders about the importance of stormwater management and their role in minimizing its	Environmental and Social Specialists of MUCE	Quarterly	N/A Part of its project cost

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		impact. o Developing an emergency response plan to address any unforeseen issues related to stormwater overflow promptly. o Establishing a long-term maintenance plan to ensure the continued effectiveness of stormwater management infrastructure throughout the operational phase			
19	Generation of Solid waste	o Implement a comprehensive waste segregation system to categorize different types of waste materials. o Establish recycling facilities to process recyclable materials such as paper, cardboard, plastics, and metals. o Develop a detailed waste management plan that outlines proper disposal methods, recycling procedures, and strategies for reducing waste generation. o Ensure adherence to the waste management plan throughout the construction and operational phases o Conduct training sessions for construction and operational staff on proper waste handling, segregation, and disposal practices. o Raise awareness among the local communities in Mkwawa, Mtwivila, and Ilala wards about the importance of responsible waste management o Ensure strict compliance with local environmental regulations and waste management guidelines. Also, obtain necessary permits and approvals related to waste disposal and management	Environmental and Social Specialists of MUCE	Quarterly	4,000,000
20	Generation of Hazardous waste	o Implement measures to minimize the generation of hazardous waste through efficient processes and technologies. o Establish a waste segregation system to separate different types of waste at the source, facilitating proper disposal and recycling. o Provide training for staff on safe handling and storage of hazardous materials to reduce the risk of accidents and spills. o Implement secure storage facilities with appropriate containment measures to prevent leaks or contamination	Environmental and Social Specialists of MUCE	Quarterly	4,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		○ Conduct regular environmental monitoring to assess the impact of hazardous waste disposal on soil, water, and air quality. ○ Implement early warning systems to detect and respond promptly to any potential environmental hazards ○ Develop and enforce stringent health and safety protocols for workers, students, and the local community to minimize health risks associated with hazardous waste exposure. ○ Provide protective equipment and training to ensure the well-being of individuals working with or near hazardous materials ○ Conduct outreach programs to raise awareness among the local community about the potential hazards associated with the project. ○ Establish communication channels to address community concerns and incorporate feedback into waste management practices ○ Develop a comprehensive emergency response plan to address accidental spills, leaks, or other hazardous incidents promptly. ○ Conduct regular drills and training exercises to ensure that all stakeholders are well-prepared to respond to emergencies. ○ Ensure strict adherence to local and national regulations regarding hazardous waste management. ○ Obtain all necessary permits and approvals, and regularly update waste management practices based on evolving regulatory requirements.			
21	Generation of Liquid waste	○ Develop and implement comprehensive waste management plans specifically targeting liquid waste generated. This includes proper disposal methods, recycling initiatives, and the use of environmentally friendly practices. ○ Optimize sanitation systems to minimize liquid waste production. This may involve the installation of water-efficient fixtures, regular maintenance to address leaks, and the use of technologies that reduce water usage in sanitation facilities. ○ Implement strategies to control and manage rainwater runoff to prevent	Environmental and Social Specialists of MUCE	Quarterly	4,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		contamination. This could involve the installation of permeable surfaces, green infrastructure, and drainage systems designed to capture and treat runoff before it enters water bodies. o Promote water-efficient practices in laboratories to reduce water consumption. This may include the use of advanced equipment that minimizes water usage, recycling systems for laboratory water, and the adoption of best practices in water conservation. o Establish monitoring programs to regularly assess liquid waste generation and ensure compliance with environmental regulations. This involves conducting regular inspections, implementing corrective actions when necessary, and maintaining records to track the effectiveness of mitigation measures o Conduct training programs for staff involved in construction and operation to raise awareness about the importance of liquid waste management. Promote a culture of environmental responsibility and provide guidelines for responsible waste disposal. o Develop and implement emergency response plans to address unforeseen spills or incidents related to liquid waste. This includes having the necessary equipment and trained personnel to respond promptly to minimize the impact on the environment.			
DECOMMISSIONING PHASE					
NEGATIVE SOCIAL IMPACT					
1	Loss of employment	o Seminars shall be conducted on alternative means of livelihood after termination of job. o Implement comprehensive employment transition programs for affected workers, including skill development and retraining initiatives to enhance their employability in alternative sectors. o Establish a support mechanism for local businesses affected by the decommissioning, providing training, and resources to adapt to new market conditions	Environmental and Social Specialists of MUCE	Upon Decommissioning phase	N/A Part of its project cost

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		○ 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 wards, such as creating alternative employment opportunities or initiating community development projects			
2	Loss of revenue to institutions and the government	○ Explore alternative revenue streams to compensate for the loss incurred from the discontinued project. ○ Identify and develop new projects or initiatives that can generate income for both institutions and the government ○ Implement economic development programs in Mkwawa, Mtwivila, and Ilala wards to stimulate local economic opportunities. ○ Encourage entrepreneurship and job creation to offset the negative economic impact on residents. ○ Engage with the affected communities to understand their needs and concerns. ○ Implement social support programs or initiatives to assist individuals and businesses impacted by the loss of economic opportunities	Environmental and Social Specialists of MUCE	Upon Decommissioning phase	N/A Part of its project cost
3	Occupational Health and Safety Hazards to workers	○ Conduct a thorough risk assessment to identify potential hazards specific to the decommissioning phase. ○ Evaluate the risks associated with excessive noise, dust emission, and moving equipment to understand their impact on workers' health and safety ○ Provide appropriate PPE such as respiratory masks, ear protection, eye protection, and safety gear to workers to minimize exposure to hazards ○ Conduct training sessions to educate workers on the potential risks and the proper use of safety equipment. ○ Increase awareness about the importance of following safety protocols and procedures.	Environmental and Social Specialists of MUCE	Upon Decommissioning phase	15,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		○ Implement measures to control excessive noise, such as using noise barriers, scheduling noisy activities during specific times, and providing noise-cancelling equipment for workers. ○ Utilize dust suppression techniques, such as water spraying and dust barriers, to minimize the dispersion of dust particles during demolition activities. ○ Utilize dust suppression techniques, such as water spraying and dust barriers, to minimize the dispersion of dust particles during demolition activities. ○ Develop and communicate a comprehensive emergency response plan to address any unforeseen incidents promptly. ○ Provide training on emergency procedures and ensure that workers are familiar with evacuation routes and first aid protocols ○ Implement a regular health check-up program for workers to monitor and address any health issues arising from exposure to occupational hazards. ○ Engage with the local community to raise awareness about the ongoing decommissioning activities and potential risks. And establish communication channels to address concerns and feedback from residents in Mkwawa, Mtwivila, and Ilala wards.			
4	Traffic accident	○ Develop a comprehensive traffic management plan that includes designated routes for transporting demolition materials. Ensure coordination with local authorities to minimize disruption and avoid congested residential areas. ○ Schedule transportation of demolition materials during off-peak hours to minimize the impact on regular traffic flow. This can help reduce the likelihood of accidents and mitigate congestion ○ Employ escort vehicles to accompany transportation trucks, providing advance notice to other road users. Clearly mark the vehicles carrying demolition materials with appropriate signage to alert drivers and	Environmental and Social Specialists of MUCE	Upon Decommissioning phase	5,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		pedestrians o Conduct public awareness campaigns to inform residents along the transport route about the decommissioning activities. Provide information on alternative routes and the timing of material transportation to minimize inconvenience o Ensure that workers involved in transportation activities are adequately trained on safety protocols. Emphasize the importance of adhering to traffic regulations and maintaining vigilance during transportation. o Develop a robust emergency response plan in case of accidents. This includes training personnel on immediate response measures, establishing communication protocols with local emergency services, and providing necessary equipment for rapid intervention. o Implement a system for regular monitoring of transportation activities, with mechanisms for reporting any incidents or near misses. This allows for proactive identification of potential issues and prompt corrective action			
NEGATIVE ENVIRONMENTAL IMPACT					
5	Loss of aesthetics due to excavation waste	o Formulate a comprehensive waste management plan specifically tailored for the decommissioning phase. And, clearly outline procedures for the segregation, collection, transportation, and disposal of demolished waste. o Implement demolition techniques that minimize the generation of waste and reduce environmental impact. o Opt for methods that allow for the salvage and reuse of materials, thereby decreasing the amount of waste generated. o Conduct a thorough site characterization and assessment to identify potential environmental sensitivities and vulnerabilities. This will aid in determining appropriate disposal methods and areas, preventing contamination of soil and water bodies. o Identify and designate specific areas for waste disposal, ensuring they	Environmental and Social Specialists of MUCE	Upon Decommissioning phase	N/A Part of its project cost

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		are environmentally suitable and comply with regulations. o Implement measures to prevent leachate from entering soil and water bodies. o Establish a monitoring and inspection program to assess the effectiveness of waste disposal measures. o Regularly inspect the disposal areas to identify and address any issues promptly. o Establish a monitoring and inspection program to assess the effectiveness of waste disposal measures. o Regularly inspect the disposal areas to identify and address any issues promptly. o Engage with the local community to raise awareness about the importance of proper waste disposal during decommissioning. Also, encourage community participation in waste management initiatives			
6	Noise pollution from demolishing works	o Restrict demolition activities to specific time periods during the day when noise impact is likely to be less disruptive, such as during normal working hours. This can help minimize the disturbance to both site workers and residents o Install temporary acoustic barriers around the demolition site to contain and reduce the spread of noise. These barriers can help absorb and block sound waves, mitigating the impact on neighbouring areas. o Inform and engage with residents and workers in the surrounding areas about the timing and nature of the demolition work. Providing regular updates and addressing concerns can contribute to better community understanding and cooperation. o Implement a comprehensive air quality monitoring system to track the emission of dust particles during demolition. This can help identify any exceedances of air quality standards and trigger immediate corrective actions. o se dust suppression techniques, such as water spraying or misting	Environmental and Social Specialists of MUCE	Upon Decommissioning phase	10,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		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. o 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. o 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			
7	Air pollution due to dust and gas emission	o Implement effective dust control measures such as water spraying or dust suppressants during demolition activities to minimize airborne dust particles. o Explore alternative demolition techniques that generate less dust, such as mechanical methods that reduce the reliance on sledgehammers and jackhammers. o Develop and enforce strict site management practices to ensure proper containment and disposal of dust-generating materials. This includes covering and securing debris during transportation. o Introduce temporary vegetative cover on exposed soil to reduce dust emissions from land levelling and grading activities. o Implement a comprehensive air quality monitoring program to assess the levels of pollutants during decommissioning. This will enable timely identification of potential issues and allow for adjustments to mitigation measures. o Mandate the use of appropriate PPE for site workers to minimize their exposure to airborne pollutants. o Conduct regular outreach programs to communicate with nearby communities about the decommissioning activities, potential air pollution impacts, and mitigation measures. Establish a communication channel for addressing concerns and feedback.	Environmental and Social Specialists of MUCE	Upon Decommissioning phase	10,000,000

Item	Potential impacts	Recommendation enhancement/mitigation measure	Responsible person/ authority	Monitoring frequency	Relative cost (TZS)
		○ Develop a transportation plan that minimizes dust emissions during the transportation of debris from the site. This may include covering trucks or choosing routes with less residential or sensitive receptor areas. ○ Ensure strict adherence to local environmental regulations and standards related to air quality and pollution control. Obtain necessary permits and approvals before initiating decommissioning activities. ○ Provide comprehensive training for site workers on environmental best practices and the importance of adhering to mitigation measures. This will help in fostering a culture of environmental responsibility.			
Total					**185,000,000**

CHAPTER 8: ENVIRONMENTAL AND SOCIAL MONITORING PLAN

8.1 Introduction

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

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

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

To ensure that mitigation measures are properly done, monitoring is essential. Table 10.1 provides details of the attributes to be monitored, frequency, and institutional responsibility and estimated costs. These costs are only approximations and therefore indicative. Costs that are to be covered by the developer are to be included in the project cost.

8.2 Monitoring Frequency and reporting

Monitoring frequency is proposed for each critical parameter depending on the likelihood and level of change over time. Some parameters take longer time to show changes while others would change in very short time. Ambient air levels of pollutant gases in and around the project should be measured annually. Air emissions should be monitored after the air pollution control device for particulate matter (or alternatively an opacity level of less than 10%). Frequent sampling for parameters should be undertaken during start-up and continue throughout the operation and 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 analysed 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 10.1) 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: Environmental and Social Monitoring Plan

Potential Impacts	Monitoring Indicator	Parameter to be monitored	Monitoring Frequency	Means of verification	Target level/Standards	Responsibility	Estimated cost (TZS) per annum
MOBILIZATION OR PRE-CONSTRUCTION PHASE							
Noise and dust pollution	Day and night noise levels	Noise level	Monthly	Inspection	TBS / WHO Standard	MUCE	2,000,000
Increased Traffic and road accidents	Number of accidents or near miss	Number of accidents or near miss	Daily	Observation	No traffic/Accidents	MUCE	2,000,000
Safety and health risks	Number and type of safety equipment such as mask, helmet gloves, safety boot and earplugs	Number of safety measures provided	Weekly	Observation	WHO/OSHA standards	MUCE	2,000,000
Generation of solid and liquid wastes	Solid and Liquid waste	Kg for Solid waste, Litres for Liquid waste	Monthly	Observation	Environmental compliance	MUCE	2,000,000
CONSTRUCTION PHASE							
Conflicts and grievances	Number of meetings held during the mobilization Phase and	-Number of complains and Incidences - Number and types of grievance	Weekly	-Observation of records of complains -Analyse records of workers and	No complains	MUCE	2,000,000

Potential Impacts	Monitoring Indicator	Parameter to be monitored	Monitoring Frequency	Means of verification	Target level/Standards	Responsibility	Estimated cost (TZS) per annum
	throughout the project Phases	reported and solved		community grievance			
Gender Discrimination	Number of men and women employed	Number of complains	Monthly	Observation of records of complains	No Violations and harassments to vulnerable groups	MUCE	3,000,000
Air pollution from noxious gasses	Measurement of ambient gaseous	Noxious gasses (CO, CO_2, NO, NO_X, SO_X)	Quarterly	Measurement of ambient gaseous	TBS / WHO Standard	MUCE	3,000,000
Air pollution from dust emission	Measurement of particulate matter	Particulate matter (PM_{10} & $PM_{2.5}$)	Quarterly	Measurement of particulate matter	TBS / WHO Standard	MUCE	3,000,000
Noise generation	Day and night noise levels	Noise level	Monthly	Inspection	TBS / WHO Standard	MUCE	2,000,000
Solid and liquid waste generation	Solid and Liquid waste	Kg for Solid waste, Litres for Liquid waste	Weekly	Observation	Environmental compliance	MUCE	3,000,000
Health and Safety risks	- Number and type of safety equipment such as mask, helmet gloves and	Number of safety measures provided;	Quarterly	Inspection; Voluntary testing;	WHO/OSHA standards	MUCE	10,000,000

Potential Impacts	Monitoring Indicator	Parameter to be monitored	Monitoring Frequency	Means of verification	Target level/Standards	Responsibility	Estimated cost (TZS) per annum
	earplugs						
Impact on natural resource (Energy and water)	Amount of water and energy consumed	N/A	Monthly	Measurement/ records/Observation	Efficient use of water	MUCE	3,000,000
Increase in accident incidences	-Number of humps on the local road; -Number of warning signs erected; -Number of people using PPEs; -Number of people trained Presence of a first aid kit	-Number of humps on the local road; -Number of warning signs erected; -Number of people using PPEs; -Number of people trained Presence of a first aid kit	Quarterly	Inspection	WHO/OSHA standards	MUCE	4,000,000
DEMOBILIZATION PHASE							
Loss of employment	Severance benefits	N/A	Once upon Decommissioning	Inspection	N/A	MUCE	N/A
Loss of business opportunities	Materials paid for	N/A	Once upon Decommissioning	Records	N/A	MUCE	N/A

Potential Impacts	Monitoring Indicator	Parameter to be monitored	Monitoring Frequency	Means of verification	Target level/Standards	Responsibility	Estimated cost (TZS) per annum
Poor waste management	Site clear of construction wastes and scrap metal	Kg for Solid waste.	Once upon Decommissioning	Inspection	Environmental compliance	MUCE	2,000,000
OPERATIONAL PHASE							
Creation of employment	-Number of local people employed -Number of women employed	N/A	Annually	Records	N/A	MUCE	N/A
Community Health and Safety	-Inspection of the emergency and detection systems; -Verification of security system and access to the campus - Inspection of available health facility in the dispensary.	-Number of accidents and incidents recorded - Availability of security guards and lighting in proper areas. -	Quarterly	Measurement of ambient gaseous	TBS / WHO Standard	MUCE	7,000,000
Air	Measuremen	Particulate matter	Quarterly	Measurement of	TBS / WHO	MUCE	3,000,000

Potential Impacts	Monitoring Indicator	Parameter to be monitored	Monitoring Frequency	Means of verification	Target level/Standards	Responsibility	Estimated cost (TZS) per annum
pollution from dust emission	t of particulate matter	(PM_{10} & $PM_{2.5}$)		particulate matter	Standard		
Solid and liquid waste generation	Solid and Liquid waste	Kg for Solid waste, Litres for Liquid waste	Weekly	Observation	Environmental compliance	MUCE	2,000,000
Health and Safety risks	- Number and type of safety equipment such as mask, helmet gloves and earplugs	Number of safety measures provided	Quarterly	Inspection; Voluntary testing;	WHO/OSHA standards	MUCE	3,000,000
Fire Hazard	-Records of authorized HSE; -Presence of fire alarm; -Presence of firefighting equipment and records of servicing; -Presence of fire hazard signs; - Presence of fire exit	Presence of fire alarm; -Presence of firefighting equipment and records of servicing; Presence of fire hazard signs; - Presence of fire exit signs	Quarterly	Inspection	Fire and Rescue Force Regulations	MUCE	1,000,000

Potential Impacts	Monitoring Indicator	Parameter to be monitored	Monitoring Frequency	Means of verification	Target level/Standards	Responsibility	Estimated cost (TZS) per annum
	signs						
Increase in Energy Demand	-Availability and condition of solar panels; - Presence of energy conserving electric lamps	Availability and condition of solar panels; - Presence of energy conserving electric lamps	Quarterly	Inspection	Efficient use of Energy	MUCE	4,000,000
Increase in water demand	-Presence of water conserving taps; -Presence of gutters on roofs; -Presence of notices on water serving means;	-Presence of water conserving taps; -Presence of gutters on roofs; -Presence of notices on water serving means;	Quarterly	Inspection and measurement	Efficient use of water	MUCE	4,000,000
Increase in HIV/AIDS and other diseases	Number of people tested by gender and Condoms distributed to end users	Number of people who have undergone HIV/AIDS test/ Number of condoms distributed	Annually	Observation of medical records	All workers reached with testing services and condoms	MUCE	3,000,000
Total							**70,000,000**

CHAPTER 9: COST BENEFIT ANALYSIS OF THE PROJECT

9.1 Introduction

This chapter presents the cost benefit analysis (CBA) of the proposed four (4) building structures (physics laboratory, Science building, Multimedia and special needs Education building and Hostels) to be built at MUCE. The estimation of cost benefit analysis reflects 18 months of the project design period. The details are not disclosed since they are still confidential in accordance to the Tanzania Procurement Act that prevents a detailed cost benefits analysis to be undertaken before tendering process. For that case, presented costs in this section are indicative and elementary qualitative description of the costs and benefits. The total operation cost has considered the indicative costs for implementation of mitigation measures as well as the cost of monitoring. However, total cost of the project will be stated later as project tendering are still in process.

9.2 Benefits related to the project

Benefits from the proposed four new building project at the university can be classified as direct benefits and indirect benefits to university, neighbour and the government. However, primary benefits of this project are further classified as direct benefits and indirect benefits. Building construction projects may generate negative benefits though; they are usually minimal compared to the positive benefits. Some of those impacts are non-quantifiable thus cannot be used in the benefit-cost analysis estimations. Generally, the benefits of the project are experienced in all phases from mobilization, construction, operation to decommissioning phase. To mention few, employment opportunities and public benefits will occur during both the construction and the operation phases. Several benefits are associated with the proposed development both at local and national level in terms of revenue generation and the multiplier effects associated with linkages with local and national economy.

Direct benefits: the proposed project will create many job opportunities, good aesthetic view, good environments for students in their studies, entrepreneurial opportunities to the surrounding community as well as increase the number of skilled labourer due to increase in the enrolment and presence of conducive environment for self-studies. Most of the non-quantifiable impacts are directly benefits to the project receptors.

Indirect Benefits: Indirect benefits from a proposed project mainly include increase in government revenue through different sectors like; TANESCO, IRUWASA, TRA etc. cultural interactions, infrastructural development, and economic growth. But since the construction project requires inputs from other sectors to produce this output, and the other sectors subsequently require inputs themselves, there will be multiple rounds of interaction among the sectors resulting in additional output from each sector of the economy.

9.2.1 Benefits to MUCE

The proposed project has positive impacts to MUCE since its benefit is a lifetime process throughout the project life span (18 months). The completion of these projects will be one of the pooling factors for increased number of students' enrolment thus in monetary cost its value has potential to increase annually. MUCE financial capacity and sustainability are going to improve by far. Further, the improved financial standing is not only going to promote enrolment but also

good governance and efficient running of the University. Teaching, Research and Public Service and its envisioned Centre of excellence in knowledge and dissemination to a wide spectrum of beneficiaries at national and regional levels are ones among the benefits. The project will also have several intangible benefits to MUCE which include improving the university's image.

9.2.2 Benefit to the Neighbourhood

The proposed establishment of new buildings meant to increase the capacity of MUCE in infrastructure. This improvement may lead to the increase in staff requirement that is technical, administrators and academicians. During and after construction phase the project is going to provide additional employment opportunities for people surrounding MUCE campus related to operation and maintenance. However, non-skilled labourer will benefit from the daily wages. University will also create business opportunities in vicinity of the campus. Business opportunities will be supporting government initiatives to create employment opportunities for Tanzanians as advocated by the current Government. Not with standing that now salaries are yet to be specified, it is envisaged that from employment, workers will get incomes, which will improve quality of their lives and perhaps improve their lifestyles. However, employment opportunities and income from salaries provided will extend beyond the workers and benefits many other people including dependents.

Moreover, employment opportunities and the benefits therein will depend on whether suitably qualified local personnel that can take up positions are available. Capacity building therefore is a prerequisite for these benefits to be realized. Alongside capacity building, there shall be a need for putting in place deliberate policies that would compel developers in the real estate economic sector to employ local labour with the requisite skills and experience. In addition, the project will also have following economic and social benefits:

- Utilization of locally available resources;
- Revenue to the Government will increase through payment of the various taxes (indirect and direct).
- Contribute to the development of housing and settlements as well as commercial real estate industry in Iringa region.
- Boosting the infrastructure and economy of the country and Iringa Municipality in particular Mkwawa ward in which the project is located.

9.2.3 Benefit to the Government

The project will benefit the government in different aspects. These includes budget saving due to the relatively decrease in MUCE financial dependence on the government. It is anticipated that during the operation phase the project will improve MUCE financial capacity and sustainability resulting from project earnings. For that case, the government will have the opportunity to use the share of the budget which was supposed to go to MUCE for other government development plans.

Further, the ability of MUCE in contributing towards the realization of National Policies such as Education Reforms through expansion of enrolment of students into various degree programmes is going to increase. The increase in the number of enrolments means the increase in financial capacity of the institution.

However, the government will benefit from the increased number of experts in priority discipline with different disciplines that will be graduating from MUCE. This will create the potential of the government to use internal resources (home country experts) in different future projects rather than contracting foreign experts.

9.3 Costs 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 255,000,000 throughout the project life cycle. 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.

9.3.1 Costs to community

The resulting negative environmental and social impacts such as noise, impairment of air quality, and Safety and health risks due to project activities will be absorbed by the surrounding communities. However, the introduction of mitigation measures will reduce the anticipated impacts. Apart from the above, no any community activities will be disrupted. MUCE is committed to mitigate the negative social and environmental impacts.

9.3.2 Costs to Government

The Government of the United Republic of Tanzania through the Ministry of Education, Science and Technology (MoEST) has secured fund from World Bank to promote Higher Education for Economic Transformation (HEET) as a catalytic force in the new Tanzanian economy. The project is designed to revitalize the key areas for innovation, economic development, and labour market relevance. Also as already mentioned the Government will directly and indirectly benefit from taxes generated during both phases of the project. Apart from tax generation, the investment will also enhance the economic growth, enhancement of industrialization and businesses.

9.3.3 Environmental Cost

Environmental cost benefit analysis is assessed in terms of the negative and positive impacts. Furthermore, the analysis is considering whether the impacts are mitigatable and the costs of mitigating the impacts are reasonable. The total cost for the mitigation of identified impacts and monitoring will be TZS 185,000,000 and TZS 70,000,000 per year, respectively.

9.4 Project cost benefit analysis

As it has been mentioned in Chapters 7–8, the potential benefits of the project, in terms of financial and social benefit are substantial. The environmental impacts can reasonably be mitigated and the financial resources needed to mitigate negative impacts, when compared to the required investment are relatively small. However, the benefit cost ratio concluded the project to have more benefits compared to the total cost of the project. This implies that the project is viable and MUCE is encouraged to develop it.

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 will be required to prepare a detailed Demolition Plan and Construction Management Plan to the satisfaction of the proponent and relevant Authorities prior to the commencement of works on site.

10.2 Objectives of the Plan

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

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

The plan will outline feasible decommissioning methods for the project, providing a general description. This description should demonstrate the practicality of the considered methods and their ability to ensure the health and safety of the public and decommissioning personnel. Design personnel should thoroughly examine the proposed decommissioning methods and take measures

to incorporate design features that will facilitate the decommissioning process. Key considerations include:

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.

10.3 Preliminary Plan

10.3.1 Project Removal Methodology and Schedule

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

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

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

The process of project removal will commence six months after closure and extend for a period of 2 years. During the initial six months following closure, the proponent will conduct an inventory of all components requiring removal or disposal. This inventory will encompass the identification of buildings and structures, to be demolished. Additionally, the method of disposal will be finalized. This information will be crucial for the development of the final decommissioning plan, which will then undergo approval by NEMC.
Upon approval of the decommissioning plan, the removal of metal parts will be prioritized within the first month to prevent any potential vandalism. Subsequently, in the second month of the decommissioning process, the focus will shift towards removing concrete structures and foundations. The resulting debris will be repurposed as fill material for rural roads.

10.3.2 Component to be demolished

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

1. **Buildings and other infrastructure**

- All construction elements, such as buildings, pillars, platforms, or ramps supporting machinery or equipment, will be dismantled and secured to ensure safety. The areas previously occupied by these structures will be restored and replanted with vegetation as

necessary.

- Equipment that is no longer functional will be sold through an auction process to scrap dealers.
- The future utilization of the water supply infrastructure (pipeline) will be determined in collaboration with the National and District Closure Committees. The project aims to transfer the pipeline infrastructure to the district for its ongoing use.
- All disturbed areas will be landscaped and re-vegetated using indigenous trees.

10.3.3 Decommissioning Phase

Project decommissioning has five phases:

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

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

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

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

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

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

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

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

Detailed information regarding the decommissioning of the project and its associated impacts, as well as proposed measures to restore the site to its former state, are provided in Table 10.1. The estimated cost for the decommissioning plan is TZS 75,000,000, which is subject to change based on currency value and other economic factors at that time.

Table 10.1: Decommissioning and Closure Plan

Activity	Closure Plan	Responsibility	Estimated Budget
Take apart all the equipment and dismantle the structures.	○ Take apart electrical devices such as air conditioners, generators, and other machinery. ○ Consult with TANESCO (Tanzania Electric Supply Company) to disconnect the power supply for the building project. ○ All concrete and metal structures, including offices, washrooms, and pavements, will be demolished. ○ Warning signs will be displayed, and a fence will be erected around all commercial buildings. ○ 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.	MUCE and Closure Committee	25,000,000
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.	MUCE and Closure Committee	15,000,000
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 dump closure plan to adapt to changes in building 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. ○ Metal materials will be collected and transported to steel factories for recycling and subsequent metal production. ○ All hazardous wastes discovered during the decommissioning of the building will be cleaned up and disposed of in	MUCE and Closure Committee	10,000,000

	accordance with regulations. o The closure committee will ensure that no waste is disposed of in water bodies.		
Rehabilitation of project site	o A suitable re-vegetation plan will be executed to restore the site to its original condition. o Measures will be implemented during the vegetation period to control surface water runoff and prevent erosion. o Regular monitoring and inspection of the area will be carried out to identify any signs of erosion, and necessary actions will be taken to rectify any occurrences. o Fencing and signage will be installed to limit access and minimize disturbances in newly vegetated areas.	MUCE and Closure Committee	25,000,000

CHAPTER 11: SUMMARY AND CONCLUSION

11.1 Summary

Environmental and Social Impact Assessment (ESIA) for the proposed establishment at MUCE was conducted to evaluate the potential environmental and social consequences of the proposed project. The assessment considered various aspects such as land use, air quality, noise, water resources, biodiversity, cultural heritage, and community well-being. During the ESIA process, a comprehensive analysis of the project's potential impacts was undertaken. It was found that the construction and operation of the new buildings would have both positive and negative effects on the environment and local communities.

On the positive side, the project would provide additional facilities for students and faculty, enhancing the educational experience and academic programs at the university. The construction phase would generate employment opportunities and stimulate the local economy. The new buildings would also contribute to the development of infrastructure in the area.

However, the ESIA identified several potential negative impacts that need to be addressed and mitigated. These included land disturbance and habitat fragmentation during the construction phase, increased traffic congestion, noise pollution, and potential impacts on the local water resources. The assessment also considered the potential disruption to the surrounding community, including noise and dust from construction activities.

To mitigate these potential negative impacts, several measures and recommendations were proposed. These included proper waste management practices, dust and noise control measures during construction, and the implementation of water conservation strategies. The assessment also emphasized the importance of engaging with local communities and stakeholders throughout the project's lifecycle, ensuring their concerns are addressed and their input is considered.

11.2 Conclusion

In conclusion, the ESIA for the proposed building project at MUCE highlighted both the positive and negative impacts. By implementing the recommended mitigation measures and actively involving local communities, the project can minimize its adverse effects on the environment and social well-being. This assessment provides valuable guidance for decision-makers, planners, and proponents to ensure that the construction project proceeds in a sustainable and socially responsible manner.

REFERENCE

1. Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations 2018.
2. World Bank Environmental and Social Standards (ESS) for HEET as stipulated in the Environmental and Social Framework (ESF) and other guiding tools such as Environmental and Social Management Framework (ESMF),
3. and stakeholder Engagement Plan (SEP).
4. Iringa Municipal Master Plan 2015 – 2035
5. Iringa Region Investment Guide, 2020).
6. Iringa Municipal Council, Five years Strategic Plan 2016/2017 to 2020/2021
7. IRUWASA Feasibility Study for Improvement of Water Supply and Sanitation Services in Iringa Municipality project, 2022
8. Mkwawa University College of Education Master Plan, 2019 – 2039.
9. The Population and Housing Census (National Bureau of Statistics), 2022
10. The Tanzania Development Vision 2025 of 2000.
11. United Republic of Tanzania, 1992.Energy Policy (1992).
12. United Republic of Tanzania, 1995. Land Policy (1995).
13. United Republic of Tanzania, 1995. The Education (Amendment) Act, 1995
14. United Republic of Tanzania, 1997. National Environmental Policy (1997).
15. United Republic of Tanzania, 1997.The Contractors Registration Act (1997).
16. United Republic of Tanzania, 1997. The Architects and Quantity Surveyors Act (1997).
17. United Republic of Tanzania, 2000. The Tanzania Development Vision (2000).
18. United Republic of Tanzania, 2000.National Human Settlements Development Policy (2000).
19. United Republic of Tanzania, 2002. National Gender Policy (2002).
20. United Republic of Tanzania, 2003.Occupational Health and Safety (2003).
21. United Republic of Tanzania, 2003. Construction Industry Policy (2003).
22. United Republic of Tanzania, 2004. Employment and Labour Relations Act No. 6 (2004).
23. United Republic of Tanzania, 2004. Environmental Management Act No. 20 (2004), Cap. 191.
24. United Republic of Tanzania, 2005 Impact Assessment and Auditing Regulations (2005).
25. United Republic of Tanzania, 2005 Impact Assessment and Auditing Regulations (2005).
26. United Republic of Tanzania, 2007. Engineers Registration Act and its Amendments 1997, Dar es Salaam, Tanzania (2007)
27. United Republic of Tanzania, 2007. The Land Act, 1999 The Urban Planning Act (2007).
28. United Republic of Tanzania, 2007. Fire and Rescue Act (2007)
29. United Republic of Tanzania, 2007. The Urban Planning Act (2007).
30. United Republic of Tanzania, 2008. The Prevention and Control of HIV/AIDS Act (No. 28), 2008
31. United Republic of Tanzania, 2008. The Workers Compensation Act (No.20), 2008
32. United Republic of Tanzania, 2009. Public Health Act (2009).
33. United Republic of Tanzania, 2009. Water Supply and Sanitation Act No. 12 (2009).
34. United Republic of Tanzania, 2009. The Standard Act of 2009
35. United Republic of Tanzania, 2021. National Environmental Policy (2021).
36. United Republic of Tanzania, 2021. HEET Project Operational Manual, WB
37. United Republic of Tanzania, 2021. HEET Project Appraisal Document, WB
38. United Republic of Tanzania, 2021. Stakeholder Engagement Plan, WB

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

APPENDICES

Appendix 1: Certificate of Occupancy

TITLE NO: 15816–MBYLR

REGISTERED: 16-6-2010

AT: 9:00 Am

Asst. Registrar of Titles

TANGANYIKA STAMP DUTY ACT

Stamp Duty Shs: 100/- Paid

and Revenue Receipt: 31823442

Land Form 22

of 16-6-2008

TANGANYIKA STAMP DUTY

Stamp Duty Shs: 159400/- Paid

on original Receipt: 31823442

16-6-2008

THE UNITED REPUBLIC OF TANZANIA

THE LAND ACT, 1999
(No. 4 OF 1999)

CERTIFICATE OF OCCUPANCY

(Under Section 29)

Title No: 15816-MBYLR
L.O. No. 342462
IRD/6292

The 16th day of June Two thousand and **ten**

THIS IS TO CERTIFY that **THE MKWAWA UNIVERSITY COLLEGE OF EDUCATION Established under the University Act. Cap.346, of P. O. Box PRIVATE BAG IRINGA** (hereinafter called "the occupier") is entitled to a Right of Occupancy (hereinafter called "the Right") in and over the land described in the schedule hereto (hereinafter called "the Land") for a term of ninety nine years from the first day of January **Two thousand and Eight** according to the true intent and meaning of the **Land Act** and subject to the provision thereof and to any regulations made thereunder and to any enactment in substitution therefore or amendment thereof and to the following special conditions:-

1. The Occupier having paid rent up to the thirtieth day of **June 2009**, shall thereafter pay rent of Shillings **Three million one hundred thousand and ninety thousand only (shs. 3,190,000/=)** on the first day of July in every year of the term without any 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.

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

   (iii) Maintain on the land building (hereinafter called "the buildings") in permanent materials designed for use in accordance with the conditions of the Right and which conform to the building line (if any) decided by the **Iringa Municipal Council** (hereinafter called "the Authority").

   (iv) At all times during the term of the Right have on the land buildings as approved by the Authority and maintain them in good order and repair to the satisfaction of the Commissioner for Lands (hereinafter called "the Commissioner").

   (v) Not erect or commence to erect on the land any building except in accordance with building plans and specifications which shall have been first approved by the Authority.

3. **USER: The Land and the buildings erected thereon Land shall be maintained and the same shall be used for Educational Purposes Use-Group K use class (b) as defined in the town and Country Planning (Use classes) Regulations, 1960 as amended in 1993.**

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

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

6. The President may revoke the Right for good cause or in public interest.

S C H E D U L E

All the land known as **Plot No. 391 Block 'E'** situate at **Mtwivila in Iringa Municipality** containing **Two hundred and fifty eight (258) hactares** shown for identification only edged **red** on the plan attached to this Certificate and defined on the registered survey plan numbered **6833** deposited at the office of the Director for Survey and Mapping at Dar es salaam.

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

ASSISTANT COMMISSIONER FOR LANDS

The, within named **MKWAWA UNIVERSITY COLLEGE OF EDUCATION** hereby accept the terms and conditions contained in the foregoing Certificate of occupancy.

SEALED with the common SEAL of)
the said MKWAWA UNIVERSITY COLLEGE OF)
EDUCATION and DELIVERED in the presence of)
us this 07th day of APRIL)
2010)
)
Witness's:)
)
Name: PROF. JOHN F. MACHUWA)
)
Signature: .....)
)
Postal Address: PRIVATE BAG, IRINGA)
)
.....)
)
Qualification: DEPUTY PRINCIPAL - ADMINISTRATION

Witness's:

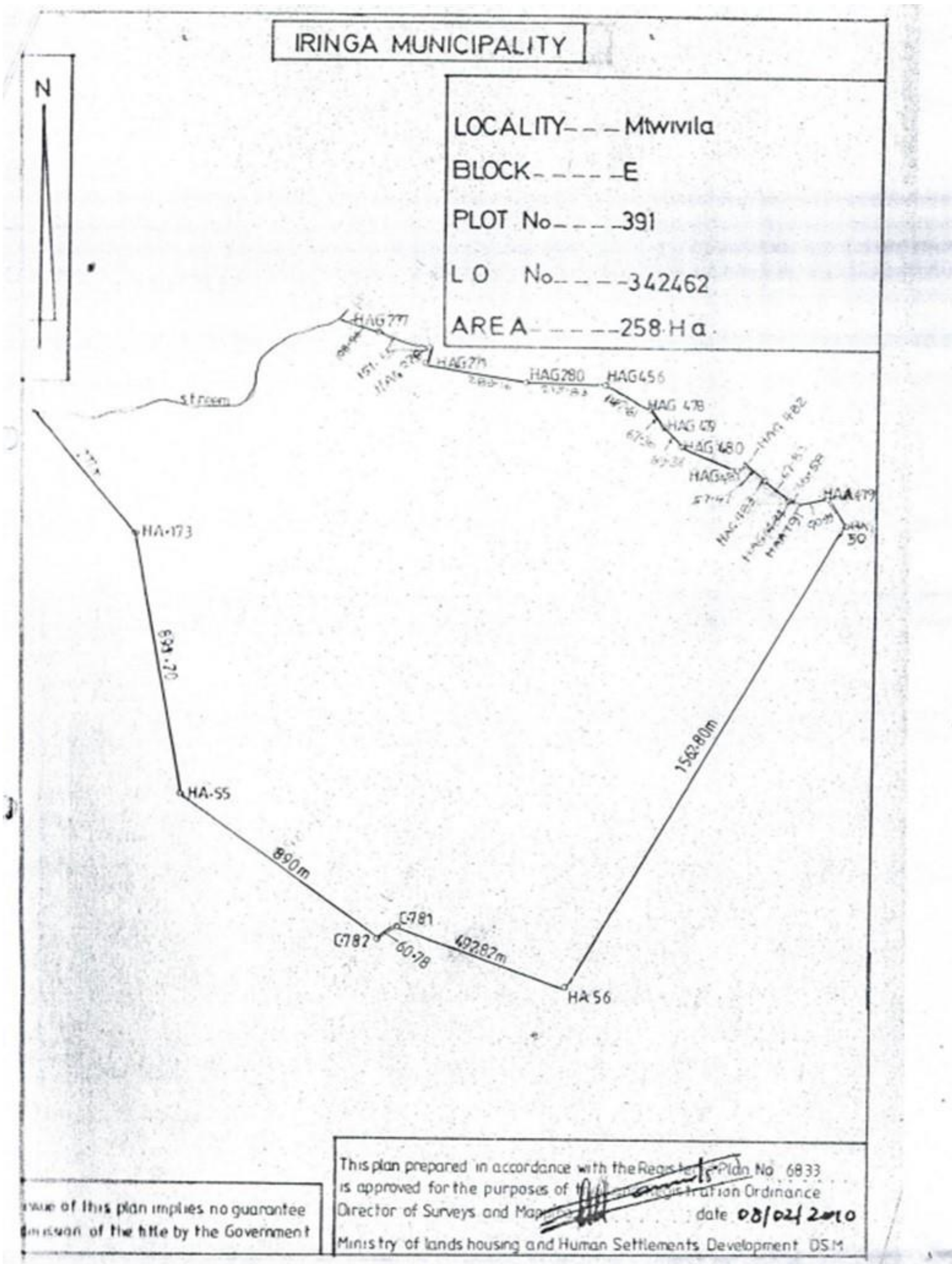
Name: ALFRED C. NYAMWANGI

Signature: .....

Postal Address: PRIVATE BAG

IRINGA.

Qualification: CORPORATE COUNSEL


IRINGA MUNICIPALITY
N
LOCALITY---Mtwivila
BLOCK-----E
PLOT No----391
L O No-----342462
AREA-----258 Ha.
stream
HAG277
HAG279
HAG280
HAG456
HAG 478
HAG 480
HA-173
HA-55
890m
C781
C782
60.78
492.82m
HA 56
1562.80m
This plan prepared in accordance with the Registered Plan No 6833
is approved for the purposes of the Registration Ordinance
Director of Surveys and Mapping
date 08/02/2010
Ministry of lands housing and Human Settlements Development DSM
issue of this plan implies no guarantee
admission of the title by the Government

Land Form 23 A.

TANZANIA

THE LAND ACT 1999
(NO. 4 OF 1999)

CERTIFICATE OF OCCUPANCY

(Under Section 29)

of Issue:

Number: 15816-MBYLR

Office Number: 342462

Plot No.391 Block E Mtwivila - Iringa Municipality

Ninety Nine(99)years

(1)

UNITED REPUBLIC OF TANZANIA

MINISTRY OF LANDS AND HUMAN SETTLEMENTS DEVELOPMENT

Telegrams:

Telephone: 2502318
In reply please quote:

LAND REGISTRY,
P.O. Box 2984,
MBEYA.

Ref. No. LR/MBY/TI 15816-MBY/L/3 23rd June 2010

To: THE MKWAWA UNIVERSITY COLLEGE OF EDUCATION
P-O Box PRIVATE BAG / RINGA

THE LAND REGISTRATION ACT (CAP.334)

RE: TITLE NO: 15816-MBY/L.O. NO: 342462
PLOT NO: 391 BLOCK 'E' MTWIVILA AREA.
/ RINGA MUNICIPALITY

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

PRINCIPAL ASST. REGISTRAR OF TITLES

Copy to: Commissioner for Lands

Appendix 2: Baseline data on Air quality, Noise and Vibrations

Appendix 2a: Average ambient pollutant gases tested from the proposed project area at MUCE

Coordinate	Location	O_2	O_3	CO_2	CO	NO	NO_X	SO_2	CH_4
		%	%	ppm	mg/m^3	mg/m^3	mg/m^3	mg/m^3	%
-7.76246 & 35.6919	Physics laboratory	20.9	<0.00	120	<0.00	<0.00	<0.00	<0.00	<0.00
-7.76058 & 35.69164	Multimedia and special need education building	20.9	<0.00	149	<0.00	<0.00	<0.00	<0.00	<0.00
-7.75981 & 35.68455	Science building	21	<0.00	110	<0.00	<0.00	<0.00	<0.00	<0.00
-7.765023 & 35.688552	Students hostel building	20.8	<0.00	132	<0.00	<0.00	<0.00	<0.00	<0.00
-7.75972 & 35.68453	Residential area	20.9	<0.00	166	<0.00	<0.00	<0.00	<0.00	<0.00
TBS Limits		**21**	**0.1**	**600**	**15**	**0.12**	**0.12**	**0.5**	**-**
WHO/IFC Guidelines		**21**	**0.12**	***500**	4	**0.2**	**0.2**	**0.5**	**-**

Sampling date: January 2024 **Source: Field Measurement**

Appendix 2b: Average particulate matter recorded from proposed project area at MUCE

Coordinate	Location	PM_{10} (mg/m^3)	$PM_{2.5}$ (mg/m^3)
-7.76246 & 35.6919	Physics laboratory	0.003	0.0034
-7.76058 & 35.69164	Multimedia and special need education building	0.0045	0.0045
-7.75981 & 35.68455	Science building	0.0072	0.0079
-7.765023 & 35.68855	Students hostel building	0.0033	0.0034
-7.75972 & 35.68453	Residential area	0.03	0.037
TBS Limits		**0.15**	**0.075**
WHO/IFC Guidelines		**0.05**	**0.025**

Sampling date: January 2024 **Source: Field Measurement**

Appendix 2c: Average Noise levels, Temperature and Humidity recorded from proposed project area at MUCE and the nearby residential area

Coordinate	Location	Noise level (dBA) during the daytime	Noise level (dBA) during the nighttime	Temperature (^oC)	Humidity (%)
-7.76246 & 35.6919	Physics laboratory	33	30.8	20.4	40

-7.76058 & 35.69164	Multimedia and Special Needs Education Building	31	30.1	20.7	40
-7.75981 & 35.68455	Science Building	30.1	30.1	20.4	40
-7.765023 & 35.68855	Students Hostel building	30	48	20.5	40
-7.75972 & 35.68453	Residential area	76	52	20.3	40
TBS Limits		**60**	**55**	**-**	**-**
WHO/IFC Guidelines		**85**	**85**	-	-

Sampling date: January 2024 **Source: Field Measurement**

Appendix 2d: Average vibration (in mm/s PPV) associated with construction activities from proposed project area at MUCE and the nearby residential area

Coordinate	Location	Vibration (mm/s)
-7.76246 & 35.6919	Physics laboratory	0.0
-7.76058 & 35.69164	Multimedia and special need education building	0.0
-7.75981 & 35.68455	Science building	0.0
-7.765023 & 35.68855	Students hostel building	0.0
-7.75972 & 35.68453	Residential area	0.01
TBS Limits		**5**
WHO/IFC Guidelines		**5**

Sampling date: January 2024 **Source: Field Measurement**