ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED ESTABLISHMENT OF ACADEMIC BLOCK AND WORKSHOP TO BE BUILT AT MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY RUKWA CAMPUS COLLEGE ON PLOT NO. 144/2, BLOCK "A", KIANDA VILLAGE, LYANGALILE WARD, SUMBAWANGA DISTRICT, RUKWA REGION, TANZANIA.

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EXECUTIVE SUMMARY

1. INTRODUCTION

Mbeya University of Science and Technology (MUST) of P. O. Box 131 Mbeya was established as Mbeya Technical College (MTC) in 1985 and offered full technical certificates programs in the fields of civil engineering, mechanical engineering, electrical engineering and architectural technology. MTC was thereafter transformed to Mbeya Institute of Science and Technology (MIST) in 2002 and inherited all programmes which were being offered by MTC. Parallel to this transformation new programmes like computer engineering, laboratory technology and business administration at Ordinary Diploma and Bachelor levels were introduced. The last transformation involved the transformation of MIST to MUST (MUST Charter 2012) and resulted to the introduction of other new Diploma, Bachelor and Postgraduate programmes. However, the increased number of students from 4,527 in 2018/2019 to 9,674 in 2022/2023 and staff from 506 in 2018/2019 to 727 in 2022/2023 is beyond the carrying capacities of the existing facilities.

Owing these such concerns, MUST intends to expand the facilities by constructing a new academic block and workshops on Plot No. 144/2 Block A, at Kianda Area in Sumbawanga District, Rukwa Region. The Plot occupies an area of 47.34 hectares (473,400 m^2) and the title deed is registered under the Mbeya University of Science and Technology. The project life span is expected to be 99 years, with total investment costs estimated at Tanzania Shillings Seventeen billion five hundred million (TZS 17,500,000,000.00).

The construction of an academic building and workshops like many other facilities must abide to the World Bank Environmental and Social Framework (ESF) and Environmental Management Act of 2004 of Tanzania which require the project developers to carry out Environmental and Social Impact Assessment prior to project implementation. The First Schedule of the Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018, categorize major urban projects including multi-storey buildings as type B1 project (borderline project), which may or may not require ESIA study and upon screening the Council will guide the course of the study. Likewise, the World Bank's Environmental and Social Standards requires the borrower to identify, assess and manage potential environmental and social impacts and risks associated with the project before project execution.

In fulfilment of the above, MUST hired a Consultant who undertook groundwork and prepared ESIA application documents which included Scoping Report and Terms of Reference (ToR) as a first step in the environmental assessment process. The documents were submitted to the Council (NEMC) and the project was registered and the Terms of Reference (ToR) were approved for undertaking ESIA study. The approval was communicated through a letter of a letter dated 8th February 2022 and allocated the application Ref No.HG.145/435/01/01 (Appendix I) and the and issued

an ESIA Certificate by NEMC. These ToR provided guidance under which the environmental and social assessment was done. Therefore, Environmental Management Act, Cap. 191, the Environmental Impact Assessment and Audit (Amendment) Regulations, 2018, and World Bank Environment and Social Framework (ESF) as well as the project's Environmental and Social Management Framework (ESMF) were observed in the study.

1.1. Project Description

The Tanzanian Government through the Ministry of Education Science and Technology (MoEST) is currently implementing a Higher Education for Economic Transformation (HEET) Project under the World Bank support. The HEET project is a five-year venture that aims to strengthen the learning environment and labour enhancing alignment of priority programs, while enhancing the delivery of knowledge to produce graduates who meet the demand and standard of the current and future labour market.

MUST as one of HEET project beneficiary is constructing a new academic block and workshops with associated facilities to be used for teaching, workshops, research, and office space. In addition, the space utilization of all building components has taken into consideration people with special needs including the disabled e.g. water closet and ramp for wheel chair bound people.

2. POLICY, LEGAL AND INSTITUTIONAL ARRANGEMENT

Policy, legal and institutional arrangement were compiled from review of documents i.e., International and Tanzanian policies, legislation, guidelines and standards. Information and data on local by-laws, institutional structures and mandates/authority were obtained from Mbeya City Council as well as the World Bank Environmental and Social Framework.

3. BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

3.1. Description of Environment

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, consultations with selected stakeholders and discussions with proponent representatives. The proposed site covering the proposed project is flat land, no important conserved area. The proposed site has been used for educational purpose since 1985. The proposed site is close to MUST health facility at a distance of 500m.

The proposed site has electrical, water supply and telecommunication system.

Floristically, the site found with both native and exotic species. The identified native species were *Vangueria infausta, Cynodon dactylon, Desmodium intortum, Sesbania sesban, Bothriochloa barbinodis*. The exotic species include *Acacia farnesiana* and

Eucalyptus camaldulensis. The vegetation of the area gives the indication for habitat for fauna and based on the vegetation condition of the area there was no indication for presence of large wild animal. Few species of birds were observed in the area while some small reptiles, and insects are expected to be present in some parts of the general area. Thus, there was no identified specie with significance conservation status (i.e. threated or endangered as per IUCN guidelines/CITES List) in the area.

3.2. Stakeholder Engagement

Communities around the project area, government authorise, regulatory authorities, students' organization, service providers (private companies) and staff were involved from preliminary studies through organised meeting. The representatives were very eager to know when the construction of the project site will be completed and among many issues raised, the following main concerns inclined on the positive and negative side of impacts were presented:

Positive impacts include but not limited to:

(i) Poverty alleviation by small and medium enterprises

(ii) Increased revenue collection in Rukwa Region

(iii) Authentic appearance of the Sumbawanga District,

(iv) Increase in Science and Technology based Research and consultancy activities

(v) Improvement of local and national economy

(vi) Creation of employment opportunities

Negative Impacts includes but not limited to

(i) The area will be prone to increase population due to influx of job seekers who will increase the demand for services such as water, electricity, residence and health services.

(ii) Increased HIV/AIDS and other infections transmissions due to increase in population and socio-interactions.

(iii) Effects of vibrations from construction equipment - causing cracks to nearby buildings

(iv) Destruction of roads by heavy construction equipment and vehicles

4. POTENTIAL IMPACTS DURING THE MOBILISATION AND CONSTRUCTION PHASE

4.1. Positive Social Impacts

- Jobs Creation/Employment Opportunities
- Increase in Income Generation Opportunities
- Changes in Lifestyle and Quality of Life

- Increased Skills and Impart Knowledge to Local Communities
- Increased Revenues to Local and National Authorities
- Increased Commercial and Social Activities around Project Locations
- Increased Income to Local Suppliers and Service Providers
- Increased Land Values

4.2. Negative Social Impacts

- Population Increases and Increased Pressure on Social Services.
- Increased in Level of Crimes.
- Community Health and Safety Risks.

4.3. Negative Environmental Impacts

- Air Pollution
- Increased Greenhouse Gas Generation
- Contribution to Climate Changes
- Reduction of CO_2 Sequestration Potential
- Increased Noise Level during Construction
- Increased Vibration

5. POTENTIAL IMPACTS DURING THE OPERATION PHASE

5.1. Positive Social Impacts

- Diversification of MUST University
- Job Creation and Employment Opportunities
- Increase in Income Generation Opportunities.
- Changes in Lifestyle and Quality of Life.
- Increased Skills and Impart Knowledge to Local Communities.
- Increased Revenues to Local and National Authorities.
- Increased Commercial and Social Activities around Project Locations.
- Increased Income to Local Suppliers and Service Providers.
- Increased Land Values.

5.2. Negative Social Impacts

- Population Increase and Increased Pressure on Social Services.
- Increased in Level of Crimes
- Prevalence of Communicable Diseases
- Price Inflation of Goods and Services
- Increased Incidence of GBV/SEA/SH
- Change in Social Values and Ethics

5.3. Negative Environmental Impacts

- Increased Runoff/Storm Water
- Health and Safety Risks Due to Fire Hazards
- Contribution to Climate Changes during the Operation Phase

6. POTENTIAL IMPACTS DURING DECOMMISSIONING PHASE

6.1. Negative Social Impacts

- Loss of life and property due to Risks of Fire and Explosions.
- Occupational Health and Safety Hazards.
- Increased Traffic Jam
- Increased in level of crimes.
- Loss of Employment and Business Opportunities.

6.2. Positive Social Impacts

- Minimized Occupational Health and Safety Hazards.
- Reduced Traffic Jam
- Increased In Level of Crimes.

6.3. Negative Environmental Impacts

- Land Pollution and Loss of Aesthetic
- Generation Demolition Waste Materials
- Air Pollution Resulting from Demolition Works
- Noise Pollution from Demolishing Works
- Loss of Revenue to Institutions and the Government

6.4. Project Alternatives

The analysis of alternatives considered three options, no action alternative, technology, and site location alternative. Evaluations considered the environmental, economic, and social aspects. The analysis of alternatives was on the action alternatives and implementation alternatives.

6.5. Environmental and Social Management Plan

The Environmental and Social Management Plan is presented in Table 30. The ESMP is an important tool that enables concerned parties to measure successes or failures of implementation of mitigation measures on identified impacts. The contractor shall implement components relevant to the actual construction and operation phases. The executing agency of the project site project is MUST Rukwa Campus to be assisted by the consultant in the implementation of the project. To minimize the potential environmental impacts, the project will require the support of various institutions as outlined in the actions of the ESMP.

An Environmental Management Plan (ESMP) has been developed to implement the proposed environmental protection measures during construction, operation, and decommissioning of the project. It supports the ESMP by maintaining a record of environmental performance and enabling adjustments to be made to mitigate environmental and socio-economic impacts during the lifetime of the project.

7. ENVIRONMENTAL AND SOCIAL MONITORING

Environmental and Social Monitoring Plan is an objective, periodical, reliable, and continuing process of observation and assessment of environmental changes. Monitoring is a long-term process, which will start from the beginning of the project and will continue throughout the life of the project. Monitoring involves the continuous or periodic review of renovation/upgrading, operation, and maintenance activities to determine the effectiveness of recommended mitigation measures. It is intended to ensure that the identified mitigation measures are implemented as recommended. It is therefore based on monitoring indicators, which will have to be compared with targets to gauge the effectiveness of the mitigation plans.

8. DECOMMISSIONING

The decommissioning works cannot be proposed at the moment with a reasonable degree of certainty, however, a preliminary decommissioning plan which gives light on to what shall be done if the need for decommissioning arises. The plan includes the methods of demolition, material handling, proposed sequences, protective measures, traffic management, occupational health and safety, and environment management as well as the estimated cost of conducting the decommissioning.

9. COST AND BENEFIT ANALYSIS

The costs and benefits of the project have been analysed to provide the base for the proponent to make a decision on whether it makes sense to continue with the project. In the analysis, both quantifiable and non-quantifiable benefits to the client and the general community were considered.

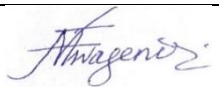
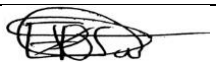
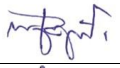
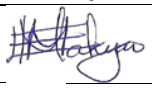
10. CONCLUSIONS

The study concludes that, the proposed project is in appropriate location as far as land use and interactions with human social and economic setting is concerned. Most of the environmental and social impacts have been identified and assessed and none of these are considered to be that severe after mitigation to prevent the further planning, design, and development of the proposed construction of the new academic block and workshops on Plot No. 144/2 Block A, at Kianda Area in Sumbawanga District, Rukwa Region.

Thus, the project in the area can be considered suitable subject to implementing the mitigation measures as indicated in the Environmental and Social Management Plan. Further, to further sustainability of the project in the area, it is recommended that the proposed Monitoring Plan should be implemented accordingly for consistent efficacy of mitigation measures or timely corrective measures before significant impacts to the environment and social components.

SIGNED DECLARATION OF THE STUDY TEAM

I hereby certify that the particulars given to this report are correct and true to the best of our knowledge and we shall provide any additional information that shall come to our notice in the course of the processing of this report.

Name of Consultant	**Position**	**Signature**
Dr. Nicholaus Mwageni	Environmental Engineer Team Leader	
Prof. Zacharia Katambara	Civil Engineer Assistant Team leader	
Ms. Everlyn Estomiah Swai	Air Quality Expert	
Mr. Christopher Mgimba	Environmental Scientist	
Mr. Edwin B. Ngailo	Economist and GBV Expert	
Mr. Lawrence Silabi	Economist	
Ms. Beatrice Makyao	Sociologist	
Ms. Mary Exaud	Botanist	
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ACKNOWLEDGEMENT

The Mbeya University of Science and Technology wishes to express heartfelt gratitude to all parties who helped to complete this project in whatever way. Officials from Sumbawanga District Council are thanked for their timely information and cooperation throughout the fieldwork. The heads of the hamlets and wards are also thanked for their cooperation and help. Thank you so much for your help and for being so quick to respond.

ACRONYMS AND ABRIVIATIONS

AQRB	Architecture and Quantity Surveyors' Registration Board
ARI	Acute Respiratory Infections
ATM	Automatic Teller Machine
CBD	Central Business District
CRB	Contractors' Registration Board
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ERB	Engineers Registration Board
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social management Plan
LGAs	Local Government Authorities
LGCDG	Local Government Capital Development Grant
MUST	Mbeya University of Science and Technology
NEMC	National Environmental Management Council
NEP	National Environmental Policy
NGO	Non-Governmental Organisation
OSHA	Occupation, Safety and Health Authority
TAC	Technical Advisory Committee
TANESCO	Tanzania Electric Supply Company
TB	Tuberculosis
ToR	Terms of Reference
TTCL	Tanzania Telecommunications Company Limited
ULGSPP	Urban Local Government Strengthening Program Project
VAT	Value Added Tax

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CHAPTER ONE

1. INTRODUCTION

1.1. Background

Mbeya University of Science and Technology (MUST) of P.O. Box 131 Mbeya was established as Mbeya Technical College (MTC) in 1985 and offered full technical certificates programs in the fields of civil engineering, mechanical engineering, electrical engineering and architectural technology. MTC was thereafter transformed to Mbeya Institute of Science and Technology (MIST) in 2002 and inherited all programmes which were offered by MTC. Parallel to this transformation new programmes like computer engineering, laboratory technology and business administration at Ordinary Diploma and Bachelor levels were introduced. The last transformation involved the transformation of MIST to MUST (MUST Charter 2012) and resulted to the introduction of other new Ordinary Diploma and Bachelor Postgraduate programmes. However, the increased number of students from 4,527 in 2018/2019 to 9,674 in 2022/2023 and staff from 506 in 2018/2019 to 727 in 2022/2023 is beyond the carrying capacities of the existing facilities.

Owing such concern, MUST intends to expand its existing facilities by constructing a new academic block and workshops on Plot No. 144/2 Block A, at Kianda Area in Sumbawanga District, Rukwa Region. The Plot occupies an area of 47.34 hectares (473,400 m2) and the title deed is registered under the Mbeya University of Science and Technology. The proposed project is funded by the World Bank through Ministry of Education, Science and Technology which has developed the Higher Education Economic Transformation (HEET) project. HEET Project focuses on the development of requisite strategies that support and catalyse transformative changes of the key sectors, with the view to build an industry-cantered economy; attain a middle-income country earning status and reduce unemployment. This national aspiration considers the need to enhance construction, trade, agriculture, transport and storage, manufacturing, financial and insurance and tourism sectors, which have been anchor points for growth of the National Gross Domestic Product [GDP]. It also asserts the importance of Agricultural Education and Training (AET), Science, Technology and Innovation in transforming various Tanzanian sectors, which is the lifeline of rural economies in Tanzania. Aim is to ensure employment for Tanzanian youth, majority of who are unemployed. The university aim to train at degree and technical levels for graduates to acquire knowledge, competency, skills and passion in Science, Technology and agri-business, which includes commercial agriculture, agro-processing industry and trade.

1.2. Project Rationale

According to the Environmental and Social Management Framework (EMSF), 2021), Tanzania has made commendable gains in basic education in recent years. For example, enrolment at the primary level has shown an increase of 24.5% from 8,116,488 in 2015 to 10,111,671 pupils in 2018 (10,601,616 in 2019). Similarly, the enrolment trend in secondary education in the year 2013/14 showed a positive increase in the number of students transitioning to post-primary education. Student demand for higher education is expected to

surge by 2030, so the tertiary education system (public and private) must expand and be of better quality to accommodate these additional students (PAD, 2021).

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 inspired 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 (agro-processing, mechanized agriculture, railway, hydropower, aeronautic etc.), Medical Science and Technology, Agriculture and Allied Sciences, Energy and Minerals, Forestry and Natural Resource Management. Another concern is on the gender issues.

HEET Project Appraisal document of 2021 points out a number of challenges in the current higher education system. These include:

(i) Gender inequality in lower levels of education (especially upper secondary) that persists up to the university level, although the gender parity index in higher education has improved from 56.5 percent in 2013 to 67.4 percent in 2018;

(ii) University graduates struggle to find jobs, at least in part due to skills mismatches;

(iii) Demand-side considerations underscore the need for greater numbers of students in disciplines and programs sought after by employers, such as engineering, agribusiness, tourism, and climate change. The overall quality of post-secondary academic programs is low and does not prepare university graduates adequately for current and future formal jobs or self-employment;

(iv) Shortage of well-trained lecturers, and the majority of academic staff use traditional teaching methodologies;

(v) Most of higher education institutions are not currently able to access or use modern technologies to deliver training; and

(vi) The global pandemic has reinforced the need for higher education institutions to develop thoughtful resiliency plans.

A more strategic mix of education, skills and technology will help Tanzania develop its productive sectors and create jobs for the growing number of youths entering the labour market (PAD 2021).

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 capacity for public universities to empower them to be dependable drivers for economic transformation by building on their respective institutional visions, missions, objectives and core values.

In line with this and since the establishment of MTC and the successive institutional transformations that have culminated to the establishment of MUST, there has been a need to increase the human resource in the fields of engineering and science as recommended in various stakeholders' meetings during review and development of curriculums for the University programmes.

MUST being a public university with the objective of assisting the government in producing competent human resource, finds it is necessary to embark on the proposed construction project so that the enrolment of students who will be pursuing engineering and technology related programmes will increase from the current 6,000 students to at least 15,000 students.

Within the Southern Africa, MUST will also have an opportunity to offer prospects students from neighbouring countries including Malawi, Mozambique, Zambia and Democratic Republic of Congo (Figure 1.1 and Figure 1.2) and conducive learning environment. Such service requires facilities including class rooms, laboratories for hands-on practical learning as well as theatre for teaching and learning purposes.

Figure 1.1: Map of Africa showing the study where the study country

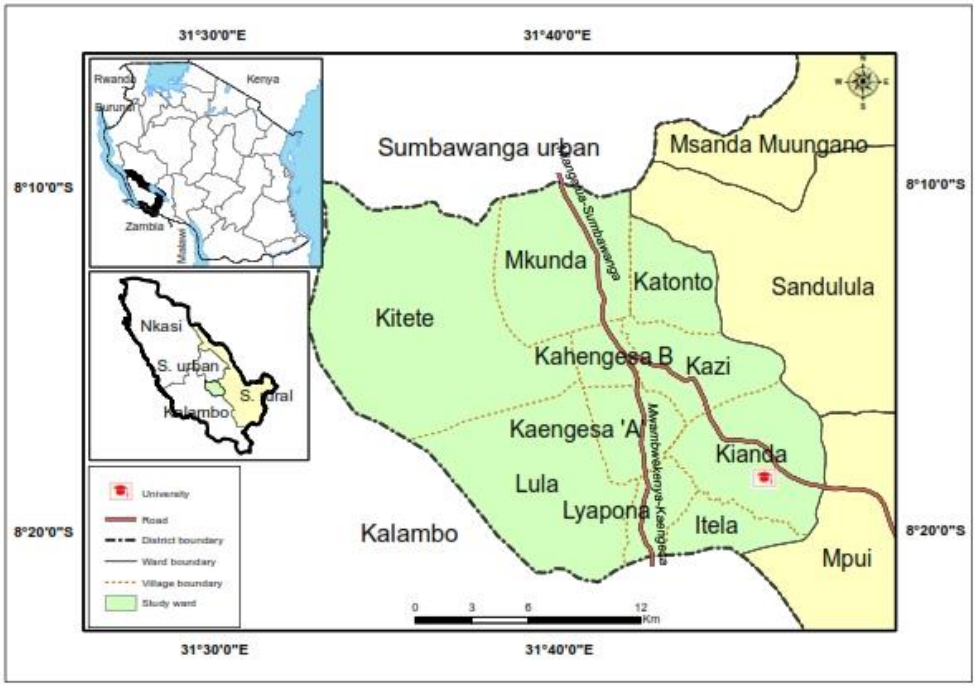

Figure 1.2: Location of Mbeya University of Science and Technology Rukwa Campus College and surrounding villages

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 Mbeya University of Science and Technology 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 15,000 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, 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, ESCF, RPF, SEP, LMP) and the provisions of the Environmental Impact Assessment and Audit Regulations, (GN) No.474 of 2018, the project beneficiary (MUST) hired the Consultant who 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 MUST HEET project: case of Main Campus

(i) In addressing the overall objective of the project, MUST is also the beneficiary of the project had the following specific objectives:
(ii) To construct and equip one academic block (with classrooms, lecture halls and laboratories) and workshop;
(iii) To upgrade learning resources and equipment including capacity building in development of online and ODL learning and pedagogy;
(iv) To update curriculum and introduce innovative pedagogical methodologies;
(v) To promote applied research and innovation capacity;
(vi) To building functional linkages with private sector/industry;
(vii) To develop online learning platforms and digital technology applications (including selecting and customizing Moodle based learning platforms);
(viii) To promote self-generated income; and
(ix) To building capacity of academic staff and university leadership.

1.4. Need for ESIA Study

The ESIA study needs to be conducted so as to understand the environmental and social sensitivities associated with the project implementation phases and to implement mitigation measures in order to avoid adverse impacts during the Project's lifecycle. The development of facilities may have certain Environmental and Social impacts which may be negative or positive. The negative environmental and social impacts need to be avoided as far as possible. The impacts which cannot be avoided need to be mitigated or managed. The key necessities of the ESIA study are:

To conduct ESIA study to take environmental and social impacts into account in the selection of preferred project options; To determine appropriate measures for mitigating/compensating anticipated environmental and social impacts at different stages of the project including the preparation of site specific ESIA and Environmental and Social Management Plan for affected persons for the Project; and To ensure the compliance with the World Bank's Environmental and Social Frameworks, safeguards Policy and Standards as well as Tanzanian regulatory requirements.

1.5. Objectives for ESIA Study

To ensure sustainability of the proposed project it is essential to integrate environmental and social concerns into the development process of MUST. The Tanzanian Environmental Management Act 2004 and the World Bank's Environmental and Social Framework (ESF) recognize ESIA as an effective tool for facilitating the inclusion of the principles of sustainable development into the project development. In addition, the ESIA report has been

prepared as per ESMF for HEET project implementation. The main objectives of this ESIA were to:

(i) Ascertain the environmental and social issues pertaining to the development of MUST sub-project,
(ii) Describe the existing bio-physical and socio-cultural features of the proposed project environment,
(iii) Assess the potential positive and negative effects, and
(iv) Recommend appropriate mitigation measures that will avoid or minimize any undesirable effects expected to result from the construction and operation activities of the project.

The MUST undertook this Environmental and Social Assessment to address the above objectives.

1.6. Scope of Work

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 make consultation with Government agencies, local communities and the private sector operating near the project area;
v. To assess and quantify the potential environmental impacts resulting from the building development, especially within the zone of influence of the project;
vi. Describe alternatives that were examined in the course of developing the proposed project and identify other alternatives, which would achieve the same objectives; and
vii. To develop an Environmental Management Plan (EMP) detailing actions and responsibilities for impacts mitigation and monitoring.

1.7. Approach and Methodology of the ESIA Study

The ESIA being a multidisciplinary field involved a team of experts, the key ones being EIA Expert (Team Leader), Civil Engineer, Environmental Engineer, Occupational Health and Safety expert, Botanist, Air quality and GIS experts, GBV expert, and Sociologist. The team identified key stakeholders and potential social and environmental impacts (positive and negative).

1.7.1. Desk Study

Desk study involved: identification and review of the country policies and laws which are relevant to the project; collection and review of previous study reports (including design reports) pertaining to the project; collection and review of information and data on the physical, social, economic, cultural as well as archaeological (if present); preliminary identification of

key issues to be included in scoping report and the main EIA study; and preparation for fieldwork, including notification of all stakeholders on the intention to conduct EIA study as well as seek their co-operation. This was done by making phone calls, writing e-mails, and distribution of letters seeking appointment to the stakeholder.

1.7.2. Fieldwork

The field visits were essential to fully realizing the scope of the project. Fieldwork intended to facilitate acquisition of information and data on physical, biological and social-economic aspects of the project site and neighbouring area. The collection of baseline data was conducted by defining the scope of the EIA. Data collected during scoping allowed the study team to determine whether more detailed information on environmental conditions at the development site and its surroundings are needed and where such information can be obtained.

1.7.2.1. Measurement of Baseline Air Quality Data

The ESIA team collected and analysed baseline air quality and noise level at the site, and adjacent areas within the University Campus. Sampling locations were selected based on relative distance to the proposed project sites, and existing multiple sources of air pollution in the campus. Sampling and analysis methodology for dust, gaseous pollutants and noise levels are presented in the following sections. Apart from the air quality data, some meteorological data of the site which have direct relationship with project implementation were collected once to enable interpretation of air quality data. These include temperature and relative humidity. The collection of data was done during the busiest day and hours (10am to 2pm) so as to predict the level of air quality during the construction phase. Statistical basis was considered but due to variation of activities during the day, the statistical data could mislead the prediction.

1.7.2.2. Measurement of Ambient Dust Levels (PM2.5 and PM10)

Dust levels were measured in terms of $PM_{2.5}$ and PM_{10}. Dust levels were measured using a portable device, brand Temtop M2000C (pictured in Figure 1.3). The Elitech Temtop M2000 2nd Generation sensor unit uses a Temtop PM200 particulate sensor, which separates dust particle size in 2.5 ug/m^3 and 10 ug/m^3 size range. The measurement principle is based on laser scattering to convert particle number to mass concentrations through its proprietary algorithm. During measurements, the device was mounted at a breathing height of approximately 1.5 meters above the ground, and samples were collected for one hour.

Figure 1.3: Temtop M2000C *Device, Used for Measurement of Dust Level*

1.7.2.3. Measurement of Ambient Gaseous Pollutants

Baseline levels of ambient gaseous pollutants were measured using a FD-4S Portable Multi-Gas Detector (pictured in Figure 1.4). The instrument operates using a heated metal oxide semiconductor. The gas molecules adsorb onto the heated surface where an oxidation-reduction reaction occurs causing a change in the electrical conductivity of the metal oxide. This change is proportional to the concentration of the gas of interest. Parameters measured included: carbon monoxide (CO) in parts per million (ppm), Oxygen (O_2) in %, and hydrogen sulphide (H_2S) in ppm. At the sites, the equipment was mounted at 1.5m above the ground. Three reading were collected at each sampling point, and the mean value was used as a representative value of that particular point. Results were compared with local and international standards.

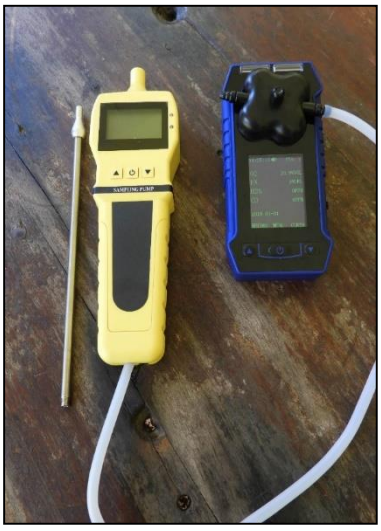

Figure 1.4: FD-4S Portable Multi-Gas Detector Used For Measurement of Ambient Gaseous Pollutants

1.7.2.4. Meteorological Conditions

Temperature and relative humidity were measured at the same sampling points used for ambient air quality, using the same device (i.e. Temtop M2000C) (see Figure 1.3). Four readings were recorded for each parameter and the average value was used.

1.7.2.5. Collection of Biological Information

The survey was based on qualitative method where by field observation using car for travelling within the entire proposed project site aided with ocular survey in places where a car couldn't go through was conducted.

The vegetation types were classified basing on their physiognomic characterization. Identification of plant species was conducted directly in the field by botanist aided by various plant identification books includes Flora of Tropical East Africa series. Existing two documents of CITES list (Convention on International Trade an Endangered Species of Wild Fauna and Flora) and the IUCN (International Union for Conservation of Nature) Red List of Threatened plant species, have been used to identify those plant species which falls in any of its categories and appendices respectively.

1.7.2.6. Collection of Socio-Economic Data

Both primary and secondary data were collected. Primary data were collected by direct measurement, observations and using semi-structured interviews with respective and targeted parties. Secondary data were obtained from various relevant sources of information such as education and many other official and non-official documents.

1.7.2.7. Noise Measurement

Noise level measurement was made along four points at the project site and the nearest receptors points at the communities. This was done using a Class Ohlson digital sound level meter type 36-1604, model ST-805 with measurement range of 30 to 130 dB(A). The meter meets ANSI S1.4 type 2 standards and conforms to IEC 651 type 2. Accuracy of the meter is ±1.5 dB of reading. The meter is calibrated using electrical calibration with built in oscillator (1 kHz sine wave).

On taking measurements, the meter was set to the "A" weighed measurement scale, which enables the meter to respond in the same manner as the human ear. The "A" scale is applicable for workplace compliance testing, environmental measurement, and workplace design and law enforcement. The meter was held approximately 1.5 m above the ground and at least 0.5 m away from hard reflecting surfaces such as trees and walls. A set of four readings were taken per point.

1.7.3. Public Participation

The EIA study identified stakeholders to be consulted and involved throughout the project life cycle (Figure 1.5). Stakeholders' identification in this study was done through a continuous and comprehensive brainstorming process to collect an exhaustive list of people/ groups or

institutions that are likely to be affected by the project/affect the project, influence the direction of the project or have those having interest over the project. In this study the following stakeholders were identified and consulted:

i. Public institutions who have influence on the project (or some components of the project). The identified stakeholders under this study were the Rukwa Regional Secretariat, Sumbawanga District Council, Ministry of Education Science and Technology (MoEST), Tanzania Commission for Universities (TCU), the Occupation and Safety Authority (OSHA) - Mbeya Office and Fire and Rescue Army;
ii. Service providers, including the Sumbawanga Water Supply Authority (SUWASA), Tanzania National Electric Supply company (TANESCO), and the Basin Water Board
iii. Project Affected Communities- the Kianda village, including vulnerable groups of people (elderly people and women), students, staffs and service providers at MUST campus.

Figure 1.5: Public Consultations/Meetings Done during ESIA Study (2023)

1.7.4. Project Impact Assessment, Identification and Development of Mitigation Measures

1.7.4.1. Project Impact Assessment

The environmental and social assessment has been undertaken in close interaction with the master plan team and the design team. In this process environmental impacts have been evaluated for various alternatives. Several project alternatives were considered including that of not implementing the project. The fundamental environmental protection strategy and

environmental considerations influencing engineering design were incorporated. However, reasonable regard to technological feasibility and economic capability were considered.

The actions undertaken to determine the significance of potential project impacts involved the following three key steps:

(i) **Prediction:** What will happen to the status of specific receptors as a consequence of this project activities (primarily; what is the magnitude of the impact?);

(ii) **Evaluation of Significance:** How significant is the impact to the identified receptors namely, affected communities and the wider environment – land, air and water? What is its relative significance when compared to other impacts?

(iii) **Residual Impacts:** After mitigation, are the impacts still of concern and/or significant? If yes, the process needs to be repeated at least once before the 'final' determination of residual impact significance occurs.

Potential impacts arising from planned activities, cumulative impacts with other developments and unplanned events (e.g. accidents, natural disasters, etc.) were also assessed. Stakeholder engagement is undertaken throughout the implementation of the proposed project to ensure that Affected and Interested Parties are aware and informed of the proposed project and have an opportunity to provide input regarding potential proposed project impacts and mitigation measures.

1.7.4.2. Project's Impact Identification

Superimposing project elements onto the existing social and environmental natural conditions made it possible to identify the potential impacts of the proposed project. The checklist method was used to identify the impacts in which the contender list of key impacts such as noise pollution, waste management was developed etc.; Further, environmental impact matrix method was adopted in identifying impacts of major concerns. A key guiding assumption in this study is that the project will be designed, constructed and operated with due care for safety and environmental matters using current and practical engineering practices and/or Best Available Technology Not Entailing Excess Cost (BATNEEC). The implementation schedule of the mitigation measures is summarized in the ESMP.

1.7.4.3. Development of Mitigation Measures

As part of the EIA process, when impacts (adverse and/or significant) were identified and could not be managed via design controls, mitigation measures were developed in line with the Mitigation Hierarchy. First, efforts were made develop measures to avoid, or prevent, then minimize or reduce adverse impacts or to enhance potential beneficial impacts. For remaining significant and moderate residual impacts, mitigation measures were developed.

1.8. Report Structure

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: -

i) Executive Summary

ii) Table of Contents
iii) Acknowledgement
iv) List of Acronyms
1. Introduction
2. Project description
3. Policy, administrative and legal framework
4. Environmental and Social Baseline/ Existing conditions
5. Stakeholders Analysis
6. Assessment of Impacts and Identification of Alternatives
7. Environmental and Social Mitigation Measures
8. Environmental and Social Management Plan
9. Environmental and Social Monitoring Plan
10. Resource Evaluation / Cost Benefit Analysis
11. Summary and Conclusions

References

Appendices.

CHAPTER TWO

2. DESCRIPTION OF THE PROJECT

2.1. Location and Accessibility

2.1.1. Location

Sumbawanga Rural District is one of three districts of the Rukwa Region of Tanzania. It is bordered to the northeast by the Sumbawanga Urban District, to the south by Zambia and to the northwest by the Nkasi District. (Figure 4). The proposed projects shall be located on plot Plot No. 144/2 o.1 &2 block 'A", Kianda Village, Lyangalile ward, Sumbawanga Rural District, Rukwa Region, Tanzania. Kianda village, where the project is located, is administratively located in Lyangalile ward, which is a recently constituted ward. The site is bordered by agriculture fields (farms) to the East and south, Kianda Village settlement and agriculture field to the west and to the north the site is bordered by Sumbawanga to Tunduma High way (Figure 2.1). Coordinates of the site are; 8°18'49.34"S 31°47'18.29"E, 8°18'52.88"S 31°47'33.88"E, 8°19'17.68"S 31°47'27.46"E and 8°19'11.72"S 31°47'5.61"E (Figure 2.1). The site is at 500m from Kianda village Settlements.

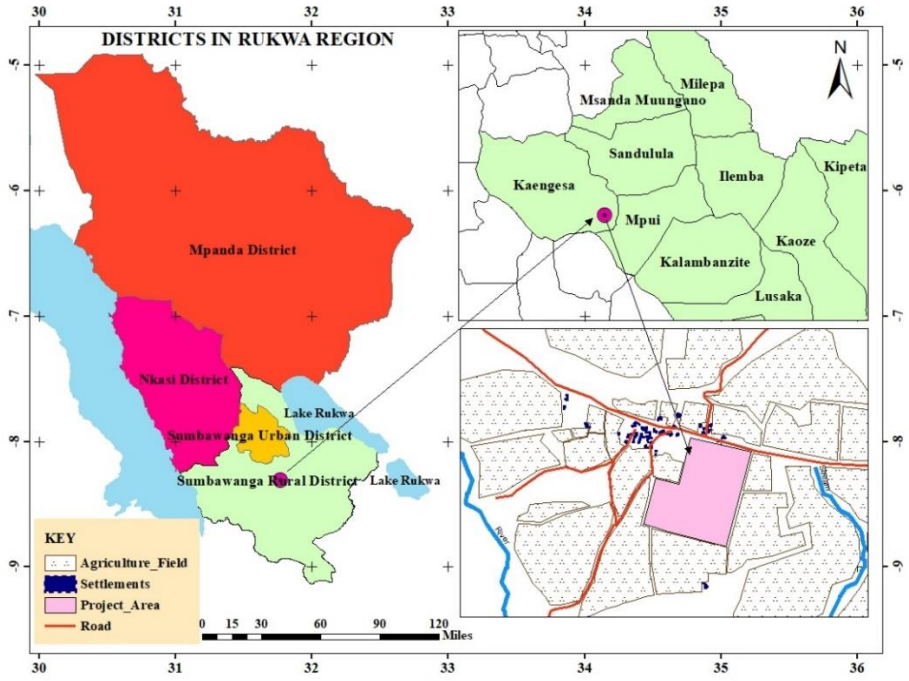

Figure 2.1: Map Showing Proposed Site Location.

Source: Consultant Analysis, 2023

2.1.2. Accessibility

The MUST Rukwa campus is well accessible as it located along Tunduma to Sumbawanga highway (tarmac road) about 45 kilometers from Sumbawanga Municipality. The campus is found on the right-hand side heading to Tunduma from Sumbawanga. The road traversing to the site is well paved having traffic separation for motorized and non-motorized traffic. The site accessibility is shown in Figure 2.2.

Figure 2.2: Satellite Image Showing the Accessibility at MUST Rukwa Campus.

Source Google Earth, 2023

2.1.3. Description of the Proposed Project Area

The MUST- Rukwa Campus site covers 47.34 Ha (473400 m^2) of land in Kianda village land. The proposed project will occupy an area of 9424 m^2 which is 2% of the campus area. The existing building occupies the area of less than 10%. The remaining part of the area which is almost 80% is meant for green area. The proposed site is characterized by grassland, open space land with scattered trees at one side and a plain field surrounded by buildings on the other side (Figure 2.3). The area for the proposed project is located on the university campus. There is no human settlement within the proposed project site but a few of them exists on the northern west side. The topography of the site is characterized by a relatively flat surface.

Figure 2.3: The Existing Situation at the Proposed Project Site.

Source; Consultant Field Observation, April 2023

2.1.4. Existing Buildings

MRCC currently has about five (5) classrooms which has the capacity of accommodating six hundred (600) students at once. The library available can allow only thirty-two (32) users at once. In addition, there are five seminar rooms with a maximum carrying capacity of fifty-five (55) students at once. There are three computer rooms and three workshop halls. The workshops sheds are for welding, mechanical and automotive works.

2.2. Project Components and Design

2.2.1. The Components of the Project

The major objective of MUST Rukwa Campus College (MRCC) project include:

a) Transforming universities with a focus on priority disciplines for economic growth;
b) Strengthening management of the higher education system and
c) Support for Project Coordination and Management.

Following this, major project components are Academic Building and Academic Workshops.

2.2.1.1. Academic Block

The plinth area covered by the Academic Block is 3,158 square meters. The Block will have three floors with a total area of 8,398 square meters. In this regard the Ground, first and second floors covers areas of 3,158, 2,620 and 2,620 square meters. The distribution of the space is given in Table 2.1 and is based on the floor levels.

Table 2.1: Academic Block Spatial Utilization of the Floors

	Name		Area (m2)	Capacity (Students/Staff)
GROUND FLOOR				
1	Electrical Laboratory		236	50
2	Applied Science Laboratory		87	30
3	Rural Technology (Consultation Office)		34	6
4	Multimedia Unit		63	15
5	Mechanical Engineering Laboratory		69	25
6	Conference Hall		302	420
7	Materials Laboratory		116	50
8	Bitumen/Asphalt Laboratory		105	50
9	Land Survey and Store		34	4
10	Fluid and Hydraulic Laboratory		116	50
11	Electronics Laboratory		116	50
12	Office		43	4
13	Toilets	Gents Toilets	8 Cubicles	
		Ladies	8 Cubicles	
		People with Disability	2 Rooms	
FIRST FLOOR				
1	Drawing Room		236	56
2	Computer /CAD/CAM/CAE Laboratory		236	87
3	Principal's Office		34	1
4	Board Room		69	18
5	Offices		69	25
6	Toilets	Gents Toilets	8 Cubicles	
		Ladies	8 Cubicles	
		People with Disability	2 Rooms	
SECOND FLOOR				
1	Lecture Hall 01		236	240
2	Lecture Hall 02		236	240
3	Lecture Room 03		105	100
4	Lecture Room 04		116	120
5	Lecture Room 05		118	120
6	Lecture Room 06		106	100
7	Offices			
7	Toilets	Gents Toilets	8 Cubicles	
		Ladies	8 Cubicles	
		People with Disability	2 Rooms	

2.2.1.2. Workshop Block

The plinth area covered by the Workshop Block is 2,325 square meters. The Block will have three wings with a total area of 2,325 square meters. In this regard there are three wings which are Wing A Wing B and Wing C they cover areas of 788, 748 and 789 square meters. The distribution of the spaces is given in Table 2.2 and is based on the wings.

Table 2.2: Workshop Block Spatial Utilization of the Floors

	Name		**Area (m^2)**	**Capacity (Students / Staff)**
Wing A				
1	Welding and fabrication workshop		218.74	50
2	Staff office 1		22	
3	Store 1		22	
4	Machine shop		214.384	50
5	Staff office 1		23.304	
6	Store 1		21.74	
7	Bench work		218.741	50
8	Staff office 1		23.304	
9	Store 1		24	
Wing B				
1	Foundry workshop		145	50
2	Staff office 1		23.304	
3	Store 1		23.304	
4	Forging workshop		140	50
5	Staff office 1		23.3	
6	Store 1		23.5	
7	Electrical workshop		218.74	50
8	Staff office 1		23.304	
9	Store 1		23.5	
10	ICT server room		23	50
11	Staff recreation room		35	
12	Main distribution board room		11	
13	Gender office / recreation room for staff		35	
Wing C				
1	Plumbing workshop		218.74	50
2	Staff office 1		23.304	
3	Store 1		21.8	
4	Masonry workshop		214.4	50
5	Store 1		21.8	
6	Office		23.304	
7	Carpentry workshop		218.74	50
8	Store 1		23.5	
9	Office		23.304	
10	Toilets	Staff gents	4 cubicles 8 urinals	
		Staff ladies	6 cubicles	
		People with disability ladies	1 room	

	Name		Area (m^2)	Capacity (Students / Staff)
		People with disability gents	1 room	
		Students gents' toilets	4 cubicles 8 urinals	
		Students ladies' toilets	6 cubcles	

2.2.2. Project Design

This ESIA study is being conducted concurrently with the preliminary design work. To expedite the design process, the University Management recruited a team of design specialists to prepare preliminary designs. It is fair to note that these designs substantially incorporated stakeholder consultations in order to foster ownership and acceptability of infrastructure that meets stakeholders' needs. The structural designs are British Standard compliant. Therefore, stakeholders including students were consulted during the design process.

2.2.2.1. Climate Change Risks Mitigation and Adaptation in the Project Design

In order to mitigate and adapt the climate change risks (e.g. heat, drought, water scarcity, etc), the design of the MUST Mbeya Campus shall accommodate the infrastructures to enhance low energy use, rainwater harvesting, storm water management systems, adequate natural ventilation and lighting, and maintaining a significant green spaces, as described hereunder;

- ***Park and open space:*** A park and public open spaces are planned to maximize the tree canopy cover and shade provided by trees in the area and more provision of ecosystem services. In the open spaces, native plants have been used to add the benefit of being useful for storm water treatment and infiltration in the valley, which is located in the central part of the site.
- ***Greenery walkways:*** The design maximizes pedestrian movement and minimizes motorized transport within the site in order to reduce air emissions (greenhouse gasses (GHGs)) and maximizing Carbon sequestration. Walkways are provided to restrict free movement that causes vegetation destruction in the site, and reducing land cover important for carbon sequestration. Trees are proposed to be planted along the vehicular access road and footpaths to improve landscape and reduce effects of sun radiation during the day.
- ***Green areas:*** Green areas are distributed in every zone/ block to allow cross fresh air into the buildings. Due to the topographical nature and nature vegetation cover, green belt and conservation zone intend to preserve the ecosystem and control land degradation. Vegetation including artificial forests will reduce soil erosion in sloping plains and all areas prone to soil erosion.
- **The building with low energy use**; Provisions for adequate openings for cross ventilation, that will ensure easy flow of clean air and reduce energy use (thus reducing emissions); provisions for motion sensors in public areas, to enable auto switch ON/OFF of lights; installation of *presence sensors* in offices, class rooms, laboratories and workshop areas; proper orientation to reduce indoor discomfort and capture natural air as much as possible and minimization of the sun effects (installation of fans; and provisions for solar lights along the pathways for sun shading); maximizing the

potential of utilization of renewable energy options such as solar and wind; Utilization of biogas from the wastewater treatment plant for cooking; buildings to be oriented and constructed to take advantage of natural lighting and cross ventilation as a means of minimizing energy consumption during operation;

- **The buildings with low footprint.** This increases green spaces; and accommodation of rainwater harvesting, storm water and waste management systems and embracing water-efficient processes.

2.2.2.2. Disaster Risk Management

The proposed project shall have provisions for fire prevention and fire-fighting facilities. Also, the buildings shall have provisions for solid waste and liquid waste management for diseases prevention. In addition, possible access roads shall be used to ensure easy walkability and vehicular access to and from the building to avoid car accidents. The roads shall be safely connected to the parking area huge enough to accommodate cars. MUST Mbeya Campus shall have an emergency management plan that assigns the responsibilities for various emergency tasks, specifically to WHO does, WHAT, WHEN AND HOW.

2.2.2.3. Gender Inclusivity

The development of the buildings focuses on creating a smart campus that substantially accommodates all needs arising from stakeholders with special needs including disabilities. (e.g., physical, learning impairment, emotional and behavioural). Among the considerations include the provision of ramps, lift, wireless connectivity, facilities for disabled stakeholder safe changing rooms and lactation room.

2.2.2.4. Occupational Health and Safety (OHS)

OHS During pre-construction phase

The structural elements of a project will be designed and constructed by competent professionals, and certified or approved by competent authorities or professionals. Where the project includes new buildings and structures that will be accessed by members of the public, the MUST will consider the incremental risks of the public's potential exposure to operational accidents or natural hazards, including extreme weather events. Where technically and financially feasible, MUST will also apply the concept of universal access to the design and construction of such new buildings and structures.

OHS During construction phase

MUST with support from the supervision consultant will ensure regular training to permanent and temporary workers (including community workers) on occupational health and safety to workers and information relevant to health risk including chorela, HIV/AIDS, COVID-19, and impacts of dust to workers health will be provided to workers. During the construction period the contractor shall provide, equip and maintain adequate personal protective equipment, first-aid stations and sign boards directing where these services are situated and transport in case of emergency. Appropriate protective gear including, but not limited to helmets, heavy duty gloves, safety vests and boots, shall be provided to site workers and visitors. Training related

to hazards and hazard management will be provided to workers and particularly as stipulated in the general IFC general EHS guidelines during construction the contractor will be required to put emphasize on training related to specific hazards such as working at height, ergonomic, slips and falls, dust and moving machinery and any other relevant hazard that will be identified during construction.

OHS During operation phase

All the emergency situations associated with building operations will be included as part of the design aspects including allocation of emergency assembly point. Emergency plans procedures will be developed to prevent and mitigate likely consequences associated with each incident. The document that details potential emergencies and response to such situations and how to prevent and mitigate the environmental aspects will be in place. Occupational Health and Safety hazards related to the daily operations of the like exposure to eruption disease, risks of fire explosion and security will be given due considerations. Fire extinguishers of powder foam type and fire hose reel will be placed in several strategic areas at the site and serviced on time.

OHS during decommissioning phase

If decommissioning has to happen, it is anticipated that the project will have hazards resulting from noise and vibration that may be caused by the operation of pile drivers, earth moving and excavation equipment, concrete mixers, cranes and the transportation of equipment, materials and people. According to IFC Guidelines specifically the general Environmental Health and Safety guidelines, slips and falls on higher elevation associated with poor housekeeping, such as excessive waste debris, loose decommissioning materials, liquid spills, and uncontrolled use of electrical cords and ropes on the ground, are also among the most frequent cause of lost time accidents at decommissioning site. To control these challenges during decommissioning phase, the contractor shall be required to have a clear understanding on the historical use of the land with regard to the potential presence of hazardous materials or oil prior to initiation of decommissioning activities, preparing plans and procedures to respond to the discovery of contaminated media to minimize or reduce the risk to health, safety, and the environment but equally important to provide adequate and the right PPEs for the anticipated hazards during decommissioning.

2.2.3. Project Design Criteria

The facility was designed and will be built in accordance with the British Standard (BS), Tanzanian government's rules and regulations. The following criteria for limit state design will be used, which are based on the BS:

(i) The steel structure will be developed in accordance with the BS 5950: Structural usage of steelwork in buildings; Part 1 Code of practice for design - Rolled and welded section.

(ii) The concrete will be developed in accordance with BS 8100: Structural usage of concrete; Part 1 Code of practice for design and construction.

(iii) The various predicted loads (dead, live, wind, and roof loads) shall be considered according to:

- BS 6399:

Part 1: Code of practice of dead and imposed loads.
Part 2: Code of practice for wind loads.
Part 3: Code of practice for imposed roof loads.
Building Research Unit Tanzania

- BRU Technical Guideline No. 2

(iv) The design of services will be based on the rules and regulations that have been recommended.

(v) Other design criteria which have been followed are:

(a) Aesthetic values added;
(b) Proper orientation to reduce indoor discomfort and minimize the effect of the sun;
(c) Easy access by people with physical disabilities;
(d) Ensure easy flow of clean air and visibility by providing less dust emitting materials and paved area;
(e) Well-designed platforms in lecture rooms for amicable communication between students and lecturer during lecture moments;
(f) Proper provision of safety measure including fire monitoring and extinguishing system;

2.3. Project Development Activities

The project implementation will involve various phases as from mobilization through construction and operation phases. Each specific phase has its own activities that need to be accomplished and these activities are well elaborated in the following subsections.

2.3.1. Activities during Mobilization Phase

Activities that will be carried under this phase of project development include:

2.3.1.1. Topographical Survey

This activity allows the designer to determine how the structures should be oriented to fit into the site area in a way that maximizes the available space while being sturdy enough to absorb any shock including earthquakes.

2.3.1.2. Architectural, Structural Engineering and Services Designs as Well as Project Costing:

In general, the aesthetic appearance of the building as well as the stability or structural integrity of the buildings and the surface of the floor enables the structure to resist against the various loads acting directly or indirectly on the various components of the building. All these will be considered during designing and construction process.

2.3.1.3. Collection of Building Materials

The mobilization phase will involve collection of the building materials like sand, gravels iron bars cement and others. The phase will also include activities of levelling the site to prepare it for construction.

Large percent of the building materials shall be sourced locally via certified suppliers. However, quality and quantity availability shall dictate the material sources (Table 2.3).
Sand, aggregates, cement, paint, masonry units, steel bars, steel columns, and roof materials will all be sourced from recognized suppliers. It's worth noting that the source of materials' preference is determined by quantity as well as quality that meets parameters. Additionally, when the items are on site, samples will be gathered for testing to ensure quality. Sand will be collected from Mpui at Tumatwa, and aggregates will be obtained from Sumbawanga Municipal at Mlangali Quarry. Sumbawanga or Mbeya suppliers will provide the timber and cement. All of the remaining materials, including the reinforcements, will be sourced from Dar es Salaam. The ground water extracted through the wells will be the primary supply of water for the site.

Table 2.3: Approximate Materials Requirements

Material	Unit	Approx. Amount	Source
Cement	Tons	4000 tones	Mbeya City/Sumbwanga
Aggregates	m^3	196,850	Sumbawanga (Mlangali)
Sand	m^3	94,450	Sumbawanga District
Steel reinforcements	Tons	917,950	Sumbawanga/Mbeya City
False works	m^2	51,984	Sumbawanga/Mbeya City
Plaster	m^2	51,984	Sumbawanga/ Mbeya City
Block wall	m^2	33,400	Sumbawanga/ Mbeya City
Roofing material	m^2	8,975	Sumbawanga/Mbeya City/Dar es Salaam
Timber	m^3	1,417	Sumbawanga/Mbeya

2.3.1.4. Equipment and Machinery

The project will use various and commonly used construction equipment some of which are listed in Table 2.4.

Table 2.4: Major Equipment to be used for Project Implementation

S/N	Type	Function	Duration (Month)	Source (Hire)
1	Wheel loader	Mobilization	1	Contractor
2	Trucks	Mobilization	10	Contractor
3	Motor grader	Mobilization	1	Contactor
4	Excavator	Construction	3	Contractor
5	Wheel loader	Construction	3	Contractor
6	Trucks	Construction	10	Contractor
7	Motor grader	Construction	1	Contractor
8	Compactor	Construction	1	Contractor
9	Concrete mixer	Construction	6	Contractor
10	Grinder	Construction	10	Contractor

2.3.1.5. Environmental and Social Impact Assessment

The task ensures that the project activities prior to construction, during construction and operation are done in a manner that does not impact the environment. This task has been undertaken by MUST.

2.3.1.6. Acquisition of Permits

Acquisition of various permits/certificates (building permit): Various permits will be secured by the proponent from relevant authorities. For the successful implementation of a project like this, necessary permits are required among them include the project registration with Engineers Registration Board (ERB), Contractors' Registration Board (CRB), Architecture & Quantity Surveyors' Registration Board (AQRB), Occupation, Safety and Health Authority (OSHA) as well as the building permit.

2.3.1.7. Transportation of the Project Materials

All the materials including sand and aggregates from the quarries will be transported by trucks to the construction site. Construction materials including timber, aggregates, blocks, cement, wire mesh and iron bars will be transported by trucks from the shops to the construction site.

2.3.1.8. Storage of Materials

Materials like aggregates and sand will be stored at the backyard of the camp site ready for use. Cement, iron bars and timber will be stored in the storage room at the campsite before they are used. Fuel will be stored in drums which shall be stored in bunds. The materials from borrow pits will be used directly after delivery to avoid piling up at the campsite.

2.3.1.9. Waste Generation during Mobilization Phase

Types, amounts and mode of treatment of wastes during the mobilization/pre-construction phase are shown in Table 2.5.

Table 2.5: Types, Amounts and Treatment of Wastes during the Mobilization Phase

Waste	Types of waste	Amount	Treatment
Biodegradable Solid waste	Food remains and plant remains	10kg/d from 20 workers whose generation rate is 0.5kg/day/ person,	Collected in a large skip bucket at the campsite then to be composted and used as manure for the gardens at the campus.
Non-biodegradable solid waste	Glasses and plastics	4kg at the generation rate of 0.2kg/d/person	Collected and transported to the designated disposal site in Sumbawanga while some will be sold to the recycling centre.
	Metal scrap	2kg at the generation rate of 0.1kg/d/person	Sold to the recyclers
Liquid waste	Sewage	0.32 m^3 (Based on 20 people, 20l/capita/day water consumption and 80% becomes wastewater)	Septic tank –Soak away system at the campsites/ office
	Hydrocarbons (grease and oil)	Non	Vehicles and machines maintenance will be done at proper garages

2.3.2. Activities during Construction Phase

Prior to the commencement of the construction of the buildings a temporal perimeter fence will be constructed to reduce disturbance to the people neighbouring the site or those passing nearby. The equipment and materials that will be used for construction process include:

- Bulldozer and Earth leveller
- Concrete mixing machines
- Vibrator and compactor for concrete
- Welding machines
- Mobile Crane
- Wheelbarrows
- General tools and tackles
- Shuttering material (wood, nails etc.)
- Generator x 2 (250 KVA)
- Water pump (10 hp motor)

Construction process shall be as per the norm, taking into consideration the safety and security issues of all workers. All the workers will be provided with appropriate person protective gears. The construction phase will involve activities like:

(i) Levelling the site before laying down the foundation;
(ii) Soil excavation and disposal of excavation spoils;
(iii) Casting reinforced concrete foundations for installation of machines and construction of the proposed buildings;

2.3.2.1. Services (Water Supply, Electricity, Communication and Waste Water Connections

The project will be connected to the following services:

a) *Electricity:* The project will be supplied by electricity from Tanzania Electricity Company (TANESCO);
b) *Water Supply:* The water demand will be met supplies from existing borehole which are about seven (7) located within the campus.
c) *Communication:* The internet if supplies by TTCL and other mobile network also serve the communities.
d) *Wastewater:* The wastewater generated will be connected to onsite waste water treatment designed to meet the wastewater generated.

2.3.2.2. Description for Waste Water Treatment Facility

The wastewater treatment facility to be used at Rukwa Campus is an Integrated Onsite Wastewater Treatment System. This System is structured to include a sequential process, beginning with an Anaerobic Baffled Reactor (ABR) designed to effectively reduce the concentration of complex organic matter. Subsequently, the partially treated effluent is directed to a constructed wetland, where further reduction of organic matter and nutrients occurs through natural filtration processes facilitated by wetland vegetation. The final stage of the treatment process involves the effluent being directed to either (a) a soak away pit for responsible disposal, promoting the percolation of treated water into the surrounding soil and preventing surface runoff, or (b) to irrigate vegetation like grass and fruit trees.

2.3.2.3. Waste Generation during Construction

The wastewater generated during construction of the project has been described including the proposed suitable disposal method.

Types, amounts and mode of treatment of wastes during the construction phase are shown in Table 2.6.

Table 2.6: Types, Amounts and Treatment of Wastes during the Construction Phase

Waste	Types of waste	Amount	Treatment
Biodegradable Solid waste	Food remains	14kg/d from 40 workers whose generation rate is 0.35kg/day/ person	Collected in a large skip bucket at the campsite then to be composted and used as manure for the gardens at the university.
	Wood debris, vegetation like grasses destroyed trees	9.2m^3 of total biomass generated	Will be used as source of energy cooking by workers
Non-biodegradable solid waste	Glasses and plastics	8kg at the generation rate of 0.2kg/d/person	Collected and transported to the designated disposal site while recyclable will sell to the recyclers.
	Metal scrap	4kg at the generation rate of 0.1kg/d/person	Sold to the recyclers
	Top soil		Backfilling material in the borrow pits, and depression along the earth road.
Liquid waste	Sewage	160l/day (Based on 40 people, 20l/capita/day water consumption and 80% becomes wastewater)	The anaerobic baffled reactor.
	Hydrocarbons (grease and oil)	Non	Vehicles and machines maintenance will be done at proper garages

2.3.3. Activities during Operation Phase

Following completion, relevant operational facilities will be maintained in accordance with university regulations and norms. During the operating phase, the following major activities will be carried out.

2.3.3.1. Teaching and Learning

The lecture theatre will be used for both teaching and learning activities. The University Master Timetable shall govern the use of these facilities. All of this will raise the cost of utilities, such as water and energy, as well as the production of liquid and solid waste.

2.3.3.2. Offices

The available offices will be assigned to staff members who are active in the University's day-to-day operations. Academic professionals who are involved in teaching and learning activities are among them. The teaching activities are expected to raise the electric bill, liquid and solid waste generation.

2.3.3.3. Service Provision

During the operation phase wastewater will be produced from various sources like the sanitary sewage from washrooms, toilets and pantry. The wastewater will be collected treated onsite treated system.

2.3.3.4. Waste Generation during Operation Phase

Types, amounts and mode of treatment of wastes during operation phase are shown in Table 2.7.

Table 2.7: Types, Amount and Treatment of Waste during the Operation Phase

Waste	Types of waste	Amount	Treatment
Biodegradable Solid waste	Food remains Vegetation (grasses and plants remain) and papers	1.05tons/d from 3000 students and staff whose generation rate is 0.35kg/day/ person,	Collected in a large skip bucket at the campsite then to be composted and used as manure for the gardens at the university. The recyclable waste materials like papers will be sold to the recyclers.
Non-biodegradable solid waste	Metal scrap, Glasses and plastics	60kg at the generation rate of 0.02kg/d/person	Collected and transported to the designated disposal site while recyclable will be sold to the recyclers.
Liquid waste	Sewage	120 m^3/day (Based on 3,000 people, 20l/capita/day water consumption and 80% becomes wastewater)	An anaerobic baffled rector that is connected to wet land and thereafter the treated water is directed to soak away pit.
	Hydrocarbons (grease and oil)	None	Car maintenance will be done at proper garages

2.3.4. Activities during Decommissioning Phase

Following decommissioning, there are two probable options for facility development: -

1. Major rehabilitation and/or upgrading of the existing building which could involve demolition and erection of new building.
2. Development of a completely new facility at a new site.

2.3.4.1. Waste Generation during Decommissioning Phase

Types, quantity and mode of treatment of wastes during Decommissioning phase are shown in Table 2.8.

Table 2.8: Types, Amounts and Treatment of Waste during the Decommissioning Phase

Waste	Types of waste	Amount	Treatment
Biodegradable Solid waste	Food remains Vegetation (grasses and plant remain) and papers	14kg/d from 40 workers	Collected in a large skip bucket at the campsite then to be composted and used as manure for the gardens at the university. The recyclable waste materials like papers will be sold to the recyclers.
Non-biodegradable solid waste	Metal scrap, Glasses and plastics	1ton	Non-recyclable will be collected and transported for disposal to the designated disposal site while recyclable materials will be sold to the recycling centre.
Liquid waste	Sewage	0.64 m^3/day (Based on 40 people, 20l/capita/day water consumption and 80% becomes wastewater)	Connected to the onsite treatment sewerage system
	Hydrocarbons (grease and oil)	Non	Vehicles and machines maintenance will be done at proper garages

CHAPTER THREE

3. ENVIRONMENTAL AND SOCIO-ECONOMIC BASELINE

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

3.1. The Physical Environment

3.1.1. Climate

Changes in the local climatic conditions have potential to affect the nature and location of project and infrastructure. Thus, it is important to assess the baseline climatic condition, and design projects with knowledge on the climate. ? District is Located at an elevation of None meters (0 feet) above sea level, Sumbawanga has a Tropical wet and dry or savanna climate (Classification: Aw). Climatic elements described here include rainfall, temperature, wind, solar radiation (sunlight/ultraviolet) and humidity. Climatic analysis detects better decision-making processes in master planning and development proposals.

The nature of the proposed project is perceived as one with minimal impact on the local climate. There are a few activities that may produce emissions with the potential to affect the local climate, including clearance of vegetation on site, emissions from construction equipment and trucks; and emissions from standby generators. The management options for these emissions shall be provided in detail in the ESMP.

3.1.2. Temperature

The temperature at Lyangalile ward, Kianda village, where the campus is located, does not differ from the temperature of Sumbawanga. The district's yearly temperature is 22.63ºC (72.73ºF) and it is -1.59% lower than Tanzania's averages. The mean annual maximum temperature in the district is 26.03^{0}C and the minimum temperature is16.15^{0}C. The warmest month in Sumbawanga is September (30.49ºC / 86.88ºF) and coldest month is July (12.98ºC / 55.36ºF). Table 3.1 presents the mean monthly temperature distribution for the Sumbawanga District.

The proposed developments at the site, have potential to cause changed in to the local mean temperature. Clearance of local vegetation and the establishment of paved area may increase the local temperature. Pavements absorb and store solar radiation, leading to a further increase in the surface temperatures. This phenomenon is known as the urban heat island (UHI) effect. Large quantities of solar radiation are absorbed by these materials during the day and released during the night time.

3.1.3. Rainfall

Sumbawanga typically receives about 271.99 millimeters (10.71 inches) of precipitation and has 213.64 rainy days (58.53% of the time) annually. Wettest month in Sumbawanga is

December (654.27mm / 25.76in) and Driest Month is July (0.59mm / 0.02in). Table 13 presents the mean monthly precipitation distribution for the Sumbawanga District. Rains in the District are more reliable falling mostly in one rain season from November to April. Soil fertility also is suitable for the growth of a wide range of crops.

Sumbawanga rainfall data were used in the design process of the proposed MUST main campus structures. Rain water harvesting and storm water management facilities have been provided to manage excess rainfall, to avoid flooding and water ponding in the area, and its surrounding.

3.1.4. Humidity

Sumbawanga District experiences relatively high humidity, averaging 68.83% daily. The overall minimum humidity condition in Sumbawanga is around 75.63%, and the maximum humidity is 92.68%. The maximum humidity is experienced in March and April, while the lowest is in September. The same conditions are expected for the MUST Rukwa campus. The monthly relative humidity in Sumbawanga District is presented in Table 3.1

Research indicates that, high humidity in the air has impacts on concrete structures in two common ways:

- **Decreased strength**: When relative humidity levels increase, the compressive strength of concrete decreases, affecting its durability.
- **Microbial growth**: Moisture creates the ideal conditions for the growth of mold, mildew, and bacteria. When mold and bacteria grow and reproduce within the concrete, they affect its strength. At the same time, the organisms may affect the health of the individuals within the affected buildings.

The design of the MUST Rukwa Campus has considered the high humidity condition of the area by adopting whether resistant construction materials such as water proof roof (concrete slabs) & Aluzinc sein coated iron sheets, and even water proof for wall paint

Table 3.1: Climate Sumbawanga District: Weather by Month

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Nov	Oct	Dec	Year
Daily mean °C	20.89	21.47	21.63	21.49	21.06	20.5	21.33	24.05	26.31	26.54	24.7	21.69	22.64
Average low °C	16.42	16.72	16.87	16.5	15.08	13.08	12.98	15.05	17.28	18.86	18.16(	16.8	16.15
Average precipitation mm	478.27	510.71	620.47	369.09	80.06	3.42	0.59	4.04	14.43	120.25	408.4	654.27	272.0
Average precipitation days (≥ 1.0 mm)	31.73	29.2	32.89	28.72	15.82	0.88	0.19	0.68	2.72	12.12	26.0	32.7	17.8
Average relative humidity (%)	92.68	91.97	93.34	92.59	85.17	72.48	62.35	51.19	46.92	54.46	73.06	91.4	75.63
Mean monthly sunshine hours sunshine hours	10.9	11.11	11.09	11.6	12.16	12.16	12.16	12.29	12.34	12.33	11.86	11.14	11.76

Source: (https://tcktcktck.org/tanzania/rukwa#t1).

Climate Change impacts

Climate change is now recognized to have a significant impact on disaster management efforts in Tanzania and pose a significant threat to the efforts to meet the growing needs of the most vulnerable populations (NCCSR, 2019). Climate change is a cross cutting issue affecting a number of sectors including forestry, agriculture, water, lands, energy, infrastructure and others. Anticipated impacts of climate changes are basically on the energy sector, transport sector, and water and sanitation sectors and on trade. The proposed project is prone to climate change risks like energy crisis. The project is designed to use the alternative energy sources to adapt the situation as well as increasing the green space coverage through reduction of buildings footprints and increasing designs of green parks within the campus.

3.1.5. Existing Land Use

Data from satellite image analysed by using GIS software shows that vegetation space in MUST – Rukwa Campus covers about 96,275 square meters, grey surface (Roads, paved surface and buildings) covers about 200,315 square meters and open space have a coverage area of 173,624 square meters. Figure 3.1 is the map of MUST- Rukwa campus which shows the area of meters covered by vegetation, buildings and open space within the campus area before project implementation.

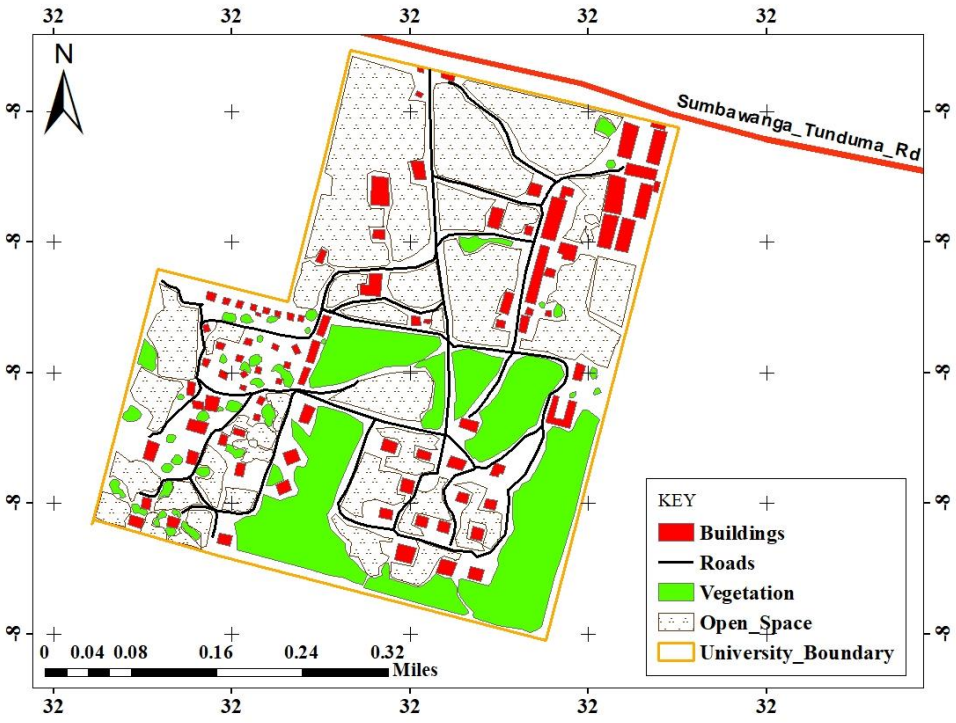

Figure 3.1: Map of MUST- Rukwa Showing Land Use within Campus.

Source: Authors reconstruct; May, 2023

3.1.6. Topography

Sumbawanga District Council is located on a flat plain with an average altitude of about 1700 metres above sea level. The topography at Lyangalile ward, Kianda village, where the campus is located, does not differ from other areas of Sumbawanga District. MUST -Rukwa campus is characterized by a large flat surface (flat plain) with minor undulations and the current built-up area also is situated on a flat surface as indicated on the digital elevation model (Figure 3.2). The topography at the MUST Rukwa campus portrays the potential for natural stormwater drainage and rainwater harvesting systems. Infrastructure design may consider utilizing this potential to ensure there is no stagnant storm water at the site and ensure well construction of a storm water drainage system and choice of location to set up wastewater treatment plants. The nature of topography indicated that soil erosion will be minimum and can be controlled.

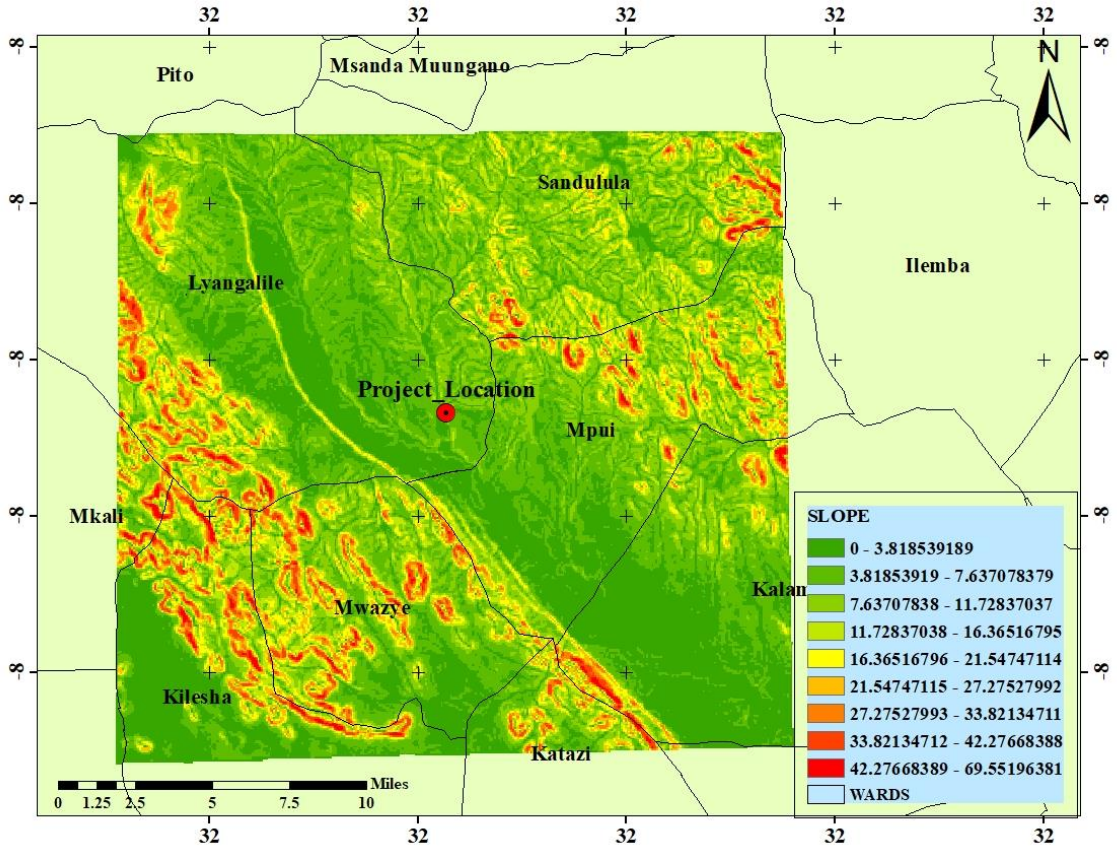

Figure 3.2: Digital Elevation Model Map Showing Topography at the Project Site.

3.1.7. Soils

The surface soil of the proposed site it is characterised by a variety of soil texture classes, including loam soil, sandy loam, silt and weathered rock are found along the soil profiles. Geotechnical investigation has revealed that the soil has bearing capacity for the proposed project (Appendix VIII).

3.1.8. Hydrology

The Rukwa Campus site as it is for the whole Sumbawanga District, is located within the Lake Rukwa Basin. Lake Rukwa Basin has five catchments including Katuma catchment, Muze and Lwiche catchment, Momba catchment, Songwe catchment (Mbeya), and Songwe Catchment (Chunya). The proposed project is located in the Momba catchment characterized by low rainfall over the entire Basin with little rainfall amounts recorded mainly in October and November compared to other catchments. The project site is not traversed by surface water streams (Figure 3.3). There are seasonal and permanent water streams around it. A kilometre away from the site in the eastern site there is a seasonal stream. While in the west there is a river that drains the south about two kilometres away from the site. The site also has a groundwater aquifer with sufficient water storage, as within the site there are seven wells which supply water to the site throughout the year. The construction of the building structures at the campus contributes to impervious surfaces leading to a higher generation of surface runoff that need more attention in their management.

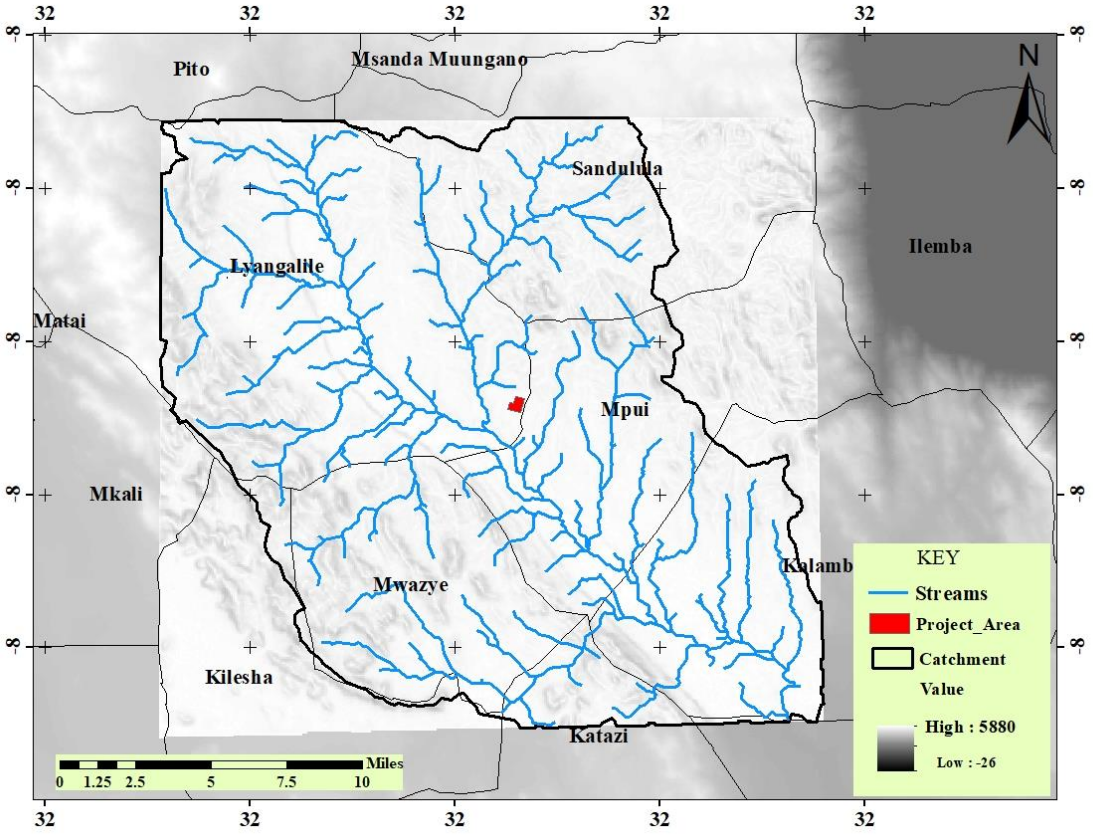

Figure 3.3: Momba Sub-catchment of Lake Rukwa in which MUST Rukwa Campus is Located

3.1.9. Air Quality

Baseline air quality data were established through physical measurements at the MUST Rukwa Campus site, in four (4) locations. Dust levels were assessed using the Casella Microdust Pro particulate monitor model 176000A. The equipment is capable to sample dust in the range from 0.01 to 2500 mg/m3 with a resolution of 0.001 mg/m3 (1µg/m3). The Microdust Pro measures particulate concentrations using a near forward angle light scattering technique. Infrared light of 880nm wavelength is projected through the sampling volume where contact with particles causes the light to scatter. The amount of scatter is proportional to the mass concentration and is measured by the photo detector (Table 3.2). Samples were collected at a breathing height of approximately 1.5 metres above the ground.

Table 3.2: The Dust Levels Recorded at Onsite Stations in Mg/M3

Point No.	GPS Readings	Reading 1	Reading 2	Reading 3	Mean	TBS PM10 Limit µg/Nm3	WHO PM 10 Limit µg/Nm3
(a) Dust levels recorded onsite as particulate matter in terms of PM_{10}							
1	366584.47 m E; 9080801.85 m S	0.021	0.064	0.004	0.030	0.1	0.1
2	366558.25 m E; 9080688.85 m S	0.028	0.069	0.001	0.033		
3	366658.71 m E; 9080685.92 m S	0.104	0.005	0.021	0.043		
4	366752.28 m E; 9080686.37 m S	0.014	0.052	0.057	0.041		
5	366714.81 m E; 9080691.29 m S	0.059	0.023	0.047	0.043		
Mean dust level in mg/m^3					**0.038**	**0.1**	**0.1**
Dust levels recorded offsite as particulate matter in terms of PM_{10}							
1	366878.31 m E; 9080291.32 m S	0.029	0.044	0.032	0.035	0.1	0.1
2	366681.01 m E; 9080241.28 m S	0.031	0.062	0.036	0.043		
3	366939.59 m E; 9080562.38 m S	0.075	0.006	0.027	0.036		
4	366535.30 m E; 9080430.65 m S	0.032	0.022	0.048	0.034		
5	366684.67 m E; 9080876.84 m S	0.038	0.028	0.033	0.033		
Mean dust level in mg/m^3					**0.036**	**0.1**	**0.1**

Source: Site measurements, April 2023

Ambient Gaseous Pollutants levels

The fugitive sources of pollutants include at the site are cars and motorcycles incidentally traversing the site (via the Sumbawanga Tunduma road), and probably smoke from nearby cooking stoves. Ambient air quality was measured in terms of concentrations of NOx HS, SO_2, CH_4 and CO_2. With were below detectable limits. The percentage concentration of CH_4 varied between (10-11) %, probably emitted by natural sources such as animals and the decomposition of organic matter. These results are an indication of the good air quality at the site, which had no visible sources of air pollution.

3.1.10. Noise Levels Measured at Onsite and Offsite Identified Stations

There are no human activities with the potential for noise generation at the proposed site. The main source of noise is from motorcycles using the Sumbawanga Tunduma road pass along the site. The road is passable throughout the year Recorded noise levels are from wind, birds and animals grazing at the site.

Noise level measurement along the pre-selected points was done using a Class Ohlson digital sound level meter type 36-1604, model ST-805 with measurement range of 30 to 130 dB(A). The meter meets ANSI S1.4 type 2 standards and conforms to IEC 651 type 2. The accuracy of the meter is ±1.5 dB(A) of reading (Table 3.3). The meter is calibrated using electrical calibration with a built-in oscillator (1 kHz sine wave).

Table 3.3: Noise Level Recorded in dB(A)

Point No.	GPS Readings	Reading 1	Reading 2	Reading 3	MEAN	TBS-MAX.NOISE LEVEL Day time(dBA)	WHO Day time (dBA)
(a) Noise levels recorded at Onsite station in dB(A)							
1	366584.47 m E; 9080801.85 m S	48.5	43.8	53.8	48.7	60	55
2	366558.25 m E; 9080688.85 m S	50.3	53.6	55.2	53.03	60	55
3	366658.71 m E; 9080685.92 m S	54.9	51.8	45.6	50.77	60	55
4	366752.28 m E; 9080686.37 m S	49.7	51.5	52.4	51.2	60	55
5	366714.81 m E; 9080691.29 m S	56.3	50.7	40.3	49.1	60	55
	Mean Noise levels at onsite receptors in dB(A)				50.56	60	55
(b) Noise levels recorded at offsite receptor in dB(A)							
1	366878.31 m E; 9080291.32 m S	48.2	42.3	52.4	47.6	60	55
2	366681.01 m E; 9080241.28 m S	49.5	52.6	54.2	52.1	60	55
3	366939.59 m E; 9080562.38 m S	53.4	50.5	46.5	50.1	60	55
4	366535.30 m E; 9080430.65 m S	49.6	51.6	49.4	50.2	60	55
5	366684.67 m E; 9080876.84 m S	55.3	49.7	39.5	48.2	60	55
	Mean Noise level for offsite receptors in dB(A)				49.6	60	55

Source: Field measurements, April 2023

Noise levels at the site was at an average 50.56 dBA. This is in comparison to the IFC Guidelines and National Environmental Standards Compendium General Tolerance Limits for Environmental

Noise (1) of 55 dB (A) for the day, set for mixed residential land use. A high noise level was recorded in the workshop where high wind speeds were blowing through the site. The main noise receptors will be residential area (staff houses).

3.1.11. Ground Vibration Level

After capturing the ground vibration level to the individual assessed locations, the exposure action value (EAV) and exposure limit value (ELV) were computed based on the assumption of 2 hours duration of exposure to the vibration per day.

The findings whose detail is presented in Table 3.4 show that with the exception to the locations close the access road, no vibration value was detected to the remaining locations. However, the detected vibration was still below the Exposure Action Value (EAV) and Exposure Limit Value (ELV).

Table 3.4: Ground Vibration Measured as Peak Particle Velocity (PPV) in Millimeters per Second

POINT NO.	GPS Readings	Measured Vibration Level, m/s^2						
		Reading 1	Reading 2	Reading 3	Reading 4	MEAN	TBS tolerance limit mm/s	WHO Mm/s
(a) Ground vibrations in mm/sPPV at onsite measured station								
1	366584.47 m E; 9080801.85 m S	0.3	0.3	0.3	0.1	0.25	5	3 -10**
2	366558.25 m E; 9080688.85 m S	0.2	0.7	0.6	0.2	0.43		
3	366658.71 m E; 9080685.92 m S	0.2	0.1	0.3	0.4	0.25		
4	366752.28 m E; 9080686.37 m S	0.1	0.4	0.2	0.3	0.25		
5	366714.81 m E; 9080691.29 m S	0.1	0.2	0.1	0.3	0.18		
Mean Vibration Level						**0.27**		
(b) **Ground vibrations measured in mm/sPPV at offsite measured station**								
1	366878.31 m E; 9080291.32 m S	0.1	0.5	0.6	0.3	0.38	5	3 -10**
2	366681.01 m E; 9080241.28 m S	0.4	0.2	0.3	0.3	0.30		
3	366939.59 m E; 9080562.38 m S	0.6	0.7	0.2	0.3	0.45		
4	366535.30 m E; 9080430.65 m S	0.4	0.8	0.1	0.6	0.48		
5	366684.67 m E; 9080876.84 m S	0.5	0.5	0.6	0.1	0.43		
Mean Vibration Level						**0.41**		

Source: Field Measurement, April 2023

EAV = Exposure Action Value (0.5 m/s^2)

ELV = Exposure Limit Value (1.15 m/s^2)

*	Computed based on 2 hours duration of exposure to vibration per day Control of Vibration at Work Regulations 2005, No. 1093 (UK.)
**	Standard DIN 4150-3 values

It can be concluded that, the area has no impact on vibrations to nearby local communities around the proposed project site. Therefore, some efforts should be directed to maintain these lowest values during constructions and operations activities of the proposed project.

3.2. Potential Natural Disasters Risks

The proposed project is at risk of climate change and climate variability risks. The rainfall trends at Rukwa where the project is going to be implemented has been erratic for the past decades leading to food insecurity and loss of natural springs. On the other hand, there is evidence of the decline of environmental resources around the project area routed by climate change and the increase of human pressure on natural resources. The proposed project shall attract more people to the project area which may compromise water and food availability. The location of the proposed site is influenced by water streams contributing to the sub-basin catchment. Streams water level fluctuation due to rainfall and other natural factors not yet known has been leading to outflow and flood occurrences and this may impact part of the proposed site. The proposed project shall increase the water level due to the generation of storm water flowing downstream hence intensifying the flood occurrences.

3.3. Ground Vibration

Data collected at the site reveals that vibration level ranges from 0.19 to 0.6m/s^2. It can be concluded that, the area has low vibration level. The proposed project shall raise the vibration level due to transportation of materials and construction activities. Therefore, deliberate efforts should be directed to maintain these lowest values during constructions and operations activities of the proposed project in order to reduce impacts to nearby local communities around the proposed project site.

3.4. Biological Characteristics

3.4.1. Fauna

The project site is a modified habitat due to anthropogenic activities especially cultivation. However, during site visit, various fauna species were identified including small mammals (*Mus musculus*), birds (*Pycnonotus barbatus, Lagonosticta rubricate, Passer domesticus, Corvus albus*) reptiles (*Agama agama, Naja nigricollis, Chamelion species) and arthropods (Apis mellifera, Pedinini Platynotina, Aeoloplides turnbulli, Phlibostroma quadrimaculata, Beetle species*). All identified fauna have been assessed for The IUCN Red list of Threated Species and listed as Least Concerned "LC". Therefore, the proposed project site is not one of the sites forming biodiversity hotspots in Tanzania.

3.4.2. Flora

The main vegetation cover on the site is characterized by grasses and scattered natural trees identified by local names as Nachinfumbe, Nchese, Mputuu, Mkuyu, Mwombe, Namtiti, Siyonga, Mlunzi, Kisongole, Mung'ongo, Mtomola, Masla, Nchinga, Mnyenyembe, Mumbula, Mpangala, and Mmbula. Pinuspatula is the dominant exotic tree species in the core project site (Figure 3.4).

Figure 3.4: Vegetation Characteristics at the Project Site

3.5. Socio-Economic Characteristics

3.5.1. Population

According to the 2022 Population and Housing Census, the total population of Sumbawanga district was 494,330 persons, out of that 255,730 were females and 238,600 were males. Specifically, Lyangalile ward comprise the population within the district with size of 9,321 person of which 4,445 are males and 4876 are females.

3.5.2. Neighbouring Area

The neighbouring areas include Kianda, Mkima, Mpui B, and Ntumbi villages. Apart from the existing cultivation, the exact planned future land use of the neighbouring areas has yet to be determined. Other businesses are anticipated to be introduced once the buildings are operational. Shops, food vendors, small industries, sports, and other small entrepreneurial activities are likely to be among the businesses that will be introduced to the place. The proposed project shall boost the socio-economic activities around the proposed project site.

3.5.3. Infrastructure and Social Services

The telephone services available are as indicated in Table 3.5.

Table 3.5: Telecommunication Services in Rukwa Region (URT, 2014a)

Service provider	Type of service	Areas covered at present	Future expansion program
TTCL	Radio transmitter and internet	Telephone and internet services in most parts of the Region	Long term plans are to rollout the TTCL Mobile services in the region and in particular opening up the rural areas with the CDMA Wireless network.
TIGO	Mobile phone	Most parts of the Region.	To cover the whole Region.
VODACOM	Mobile phone	Most parts of the Region	To cover the whole Region.
ZANTEL	Mobile phone	Most parts of the Region	To cover the whole Region.
AIRTEL	Mobile phone	Most parts of the Region	To cover the whole Region.

3.5.4. Water Supply

The water supply service level in the villages is now less than 50% (Table 3.6). The proposed project shall seek alternative water supply to meet the demand from construction and operation.

Table 3.6: Sumbawanga District Water Supply (URT, 2014a)

TYPE OF WATER SCHEME	TOTAL SCHEME	FUNCTIONING WATER SCHEMES
Gravity	15	15
Pumping scheme	0	0
Borehole (Hand pump)	81	81
Borehole (Diesel)/ submersible	0	0
Shallow Wells	42	64
Protected spring	16	16

The buildings to be constructed will also use some of the infrastructure already connected to the existing university buildings. The water for instance will be obtained from the existing wells

3.5.5. Economic Activities

Agriculture (crops, livestock, fisheries, and forestry), tourism, and mining are the main producing sectors in the region. Agricultural activities provide a living for almost 80% of the population in Rukwa Region. There are 1,660,600 hectares of arable land, but only 447,079 (32%) hectares are under cultivation. Small-scale subsistence farming dominates agriculture in the Rukwa region, with smallholder farmers operating between 0.5 and 2.0 ha accounting for about 68% of cultivated land (URT, 2014a). The main food crops produced in the region include: Maize, beans, finger millet, cassava, sorghum, paddy, sweet potatoes, irish potatoes, wheat and banana. The cash crops

that the region depends on are: sunflower, simsim, groundnuts, sugarcane and barley. The project shall stimulate villagers to cultivate food crops that will sustain their households and for business activities. Thus, the economic situation for the surrounding villages shall be improved due to the enrolment to be inclined by additional of facilities.

3.5.6. Health Services

Generally, the region has 179 health facilities whereas the distribution in districts is as indicated in Table 3.7. Malaria, ARI, Pneumonia, Diarrhoea, Skin infections, Intestinal worms, Minor surgical disorders, Eye infection, HIV/AIDS/STI, Tuberculosis, Meningitis and other diseases have caused an increased morbidity and mortality rates in the region. This is good news to the students and staff as there are enough health services to serve the proposed population.

Table 3.7: Number and Ownership of Health Facilities

District	Hospital			Health center			Dispensary			
	Gvt	V.A	Total	Gvt	V.A	Total	Gvt	V.A	Pr	Total
S'wanga District	0	0	0	6	1	7	54	2	1	57
S'wangaMunicpal	1	1	2	1	2	3	19	4	6	29
Kalambo	0	0	0	3	0	3	49	5	0	54
Nkasi	0	1	1	3	4	7	36	3	0	39
Total Region	1	1	3	13	7	20	158	14	7	179

Source: (URT, 2014a) *KEY: Gvt = Government, V.A = Voluntary Agency, Pr = Private,*

3.5.7. HIV Status in Project Regions

According to THMIS of 2011/2012 the HIV/AIDS prevalence in Rukwa was 6.2%. It worth taking mitigation measures as the project involves influx of people from different part of the country, the context which might lead to the increase in the disease prevalence. The project shall have sensitization programme on HIV and other communicable diseases to reduce health implication due to the increased enrolment inclined by the existence of additional facilities to be built onsite.

3.5.8. Education Services

3.5.8.1. Primary Education

There are 357 primary schools in the region, 353 of which are public and four (4) of which are privately owned. There are 80 secondary schools in the region, 68 of which are public and 12 of which are privately operated. More information shown in Table 3.8.

Table 3.8: Primary and Secondary Schools in Rukwa Region

District	Primary Schools		Secondary School	
	Govt	Private	Govt	Private
S'wanga (R)	103	0	15	5
S'wanga (U)	55	3	17	10
Nkasi	98	1	22	1
Kalambo	97	0	15	4

3.5.8.2. College/University

The region has four (4) Teachers' Training Colleges (TTC) that produces Grade IIIA Teachers and Diploma Teachers. There are only three higher learning Institutions in the region. These include the MUST the owners of the project to be developed at Rukwa Campus College. The increase of facilities guarantees the additional enrolment Within Rukwa and nearby regions. This will reduce transportation costs to parents and other disturbances to students are they will be near the home places in case of emergencies.

CHAPTER FOUR

4. POLICY, ADMINISTRATIVE AND LEGAL FRAMEWORK

4.1. Introduction

In Tanzania there are several policies, legal and administrative structures that govern execution of environmental and social impact assessment (ESIAs). The administrative aspects require that all the new projects that are likely to affect the environment should have an environmental impact assessment done and submitted to the National Environment Management council (NEMC). The objective being to evaluate the environmental and social impacts and risks of the proposed development on the environment and to provide appropriate mitigation measures.

In constructing the proposed project in the area, various environmental and social issues may arise at any phase of the project development i.e. from site selection, mobilization to decommissioning phases. These issues need to be addressed so that the envisaged operations do not impair the integrity of the environment and ensure that they are in line with policies and legal regime operating in Tanzania as well as World Bank safeguards policies. This chapter list down relevant policies and legislations pertaining to the planning and implementation of the proposed project.

4.2. Relevant Policies

The following are relevant sectoral and cross–sectoral policies which provide directives on how the project should be operated in relation to concerned environmental and socio-economic settings. MUST will need to observe these policies in the course of designing and implementing the proposed project activities.

4.2.1. The National Environmental Policy (NEP) of 2021

Tanzania currently aims to achieve sustainable development through the rational and sustainable use of natural resources and to incorporate measures that safeguard the environment in any development activities. The environmental policy document seeks to provide the framework for making the fundamental changes that are needed to bring consideration of the environment into the mainstream of the decision-making processes in the country.

The National Environmental Policy as a national framework for environmental management emphasized that the housing development sector shall focus on the following environmental objectives:

i. To strengthen coordination of environmental management in sectors at all levels;
ii. To enhance environmentally sound management of land resource for socio-economic development;
iii. To promote environmental management of water sources;
iv. To strengthen conservation of wildlife habitats and biodiversity;
v. To enhance conservation of forest ecosystems for sustainable provision of environmental goods and services;

vi. To manage pollution for safe and healthy environment;
vii. To strengthen the national capacity for addressing climate change impacts;
viii. To enhance conservation of aquatic ecosystem for sustained ecological services and socioeconomic wellbeing;
ix. To ensure safety at all levels of application of 39 modern biotechnology;
x. To promote gender consideration in environmental management; xi) To promote good governance in environmental management at all levels; and
xi. To ensure predictable, accessible, adequate and sustainable financial resources for environmental management.

Commitments: The NEP advocates the adoption of Environmental Impact Assessment (EIA) as a tool for screening development projects which are likely to cause adverse environmental impacts. The proponent has initiated a process in view of the policy objectives.

4.2.2. The National Education and Training Policy (2014)

Science, technology and innovation provides a good foundation for the envisaged economic transformation as implied in the National Science and Technology Policy, 1996. The National Education and Training Policy, 2014 highlight the need for quality education at all levels of the education supply chain. As part of the need to strengthen use of science and technology in national development and upon considering that the expansion of the middle level and higher education sectors ofeducation supply chain has mainly involved non-science programmes, the government has, of recent, renewed the call for strengthening science teaching and learning education.

Commitments: Through establishment of the project, the proponent is in-line with this policy as it will improve the university capacity in providing quality education.

4.2.3. The National Research and Development Policy (2010)

Tanzania recognizes the power of science and technology in national development. The policies echo the need to embrace science and technology in development. Thus, in aspiring to achieve the objectives of these policy frameworks, government take cognizance of the weak links between research and development and continued low transition of youths into science and technology disciplines. Low transition into science and technology disciplines is partly as a result of weaknesses of science teaching foundation, which is partly attributed to inadequate numbers of qualified science teachers. The university will also addressee research issues and thus in line with the policy requirements.

Commitments: Proponent shall address research issues and thus in line with the policy requirements.

4.2.4. The Construction Industry Policy (2003)

Among the major objectives of the policy, which supports a sustainable building development sector, include the promotion and application of cost effective and innovative technologies and practices to support socio-economic development activities such as buildings, road-works, water supply, sanitation, shelter delivery and income generating activities and to ensure application of practices, technologies and products which are not harmful to either the environment or human health.

Commitments: This project is in-line with this policy as ultra-modern technology shall be used during construction and its operation.

4.2.5. The National Land Policy (2019)

The National Land Policy states that, "the overall aim of a 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 National Land Policy advocates the protection of land resources from degradation for sustainable development. Among other things the policy requires that project development should take due consideration the land capability, ensures proper management of the land to prevent erosion, contamination and other forms of degradation. Important sections of the policy relevant to the Proponent are 2.4 (on use of land to promote social economic development), section 2.8 (on protection of land resources) and section 4 (on land tenure). Section 4.1.20 provides guidance on compensation for land acquired, and section 4.2.0 provides guidance on land administration.

Commitment: Proponent shall observe these provisions and ensure no land conflict to his neighbours and adhere to approved land use.

4.2.6. 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 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.

Commitment: The proponent shall adopt the policy through the provision of equal opportunities to both men and women in construction and related activities.

4.2.7. The National Policy on HIV/AIDS (2001)

The National Policy on HIV/AIDS (2001) was formulated by the Government of Tanzania (GOT) under technical support from the World Health Organization Global Programme on AIDS (WHO-

GPA) that led to the establishment of National HIV/AIDS Control Programme (NACP) under the Ministry of Health. However, due to its multi-sectoral nature there was a need to involve all sectors and community participation was found to be crucial. One of the government strategic initiatives is to establish Tanzania Commission for AIDS (TACAIDS) under the Prime Minister's Office. The Commission provides leadership and coordination of national multi-sectoral response to the HIV/AIDS epidemic. The management functions, institutional and organizational arrangement of TACAIDS are outlined in the National Policy.

The policy identifies HIV/AIDS as a global disaster, hence requiring concerted and unprecedented initiative at national and global levels. It recognizes HIV/AIDS as an impediment to development in all sectors, in terms of social and economic development with serious and direct implication on social services and welfare. Thus, the policy recognizes the linkage between poverty and HIV/AIDS, as the poor section of the society are the most vulnerable.
The main policy objective is reflected well in the establishment of TACAIDS. However, the policy has also set a number of strategic objectives to deal with specific HIV/AIDS problems:

- Prevention of transmission of HIV/AIDS;
- HIV Testing;
- Care for People Living with HIV/AIDS (PLHAS);
- Enhance Sectoral roles through participation and financial support;
- Promote and participate in research on HIV/AIDS-including dissemination of scientific information and development of HIV vaccine;
- Creating a legal framework through enactment of laws on HIV/AIDS-governing ethical issues and legal status of HIV/AIDS affected families;

Individuals will also be responsible for protecting themselves and others contracting infection through unprotected sexual intercourse and unsterilized piercing objects. The community requires accurate information on how to protect family members from further transmission and spread of HIV/AIDS.

Commitment: The proponent shall observe this policy by introducing awareness creation programmed and sensitization to protect workers and communities around the project area against HIV/AIDS both during the project establishment phases.

4.2.8. The National Health Policy, 2008

The National Health Policy is aimed at providing guidance regarding improvement and sustainability of the health status of all people by reducing disability, mobility and morbidity, improving nutritional status and raising life expectancy. The objectives of the policy among others include reduction of the burden of disease, maternal and infant mortality, and increase life expectancy through the provisions of adequate and equitable services. Furthermore, the policy aims at facilitating the promotion of environmental health and sanitation, adequate nutrition, control of communicable diseases and treatment of common conditions. The policy also

emphasises environmental cleanliness, monitoring of food and water quality, and safety achieved through collaboration with other stakeholders.

Commitment: The proponent will ensure that his operations adhere to the National Healthy Policy as the student population increases.

4.2.9. The National Water Policy 2002

The National Water policy was formulated to provide a comprehensive framework for sustainable development and management of water resources in Tanzania. It aims at ensuring that beneficiaries participate fully in planning, construction, operation, maintenance and management of community based domestic water supply schemes. It seeks to address cross- sectoral interests in water, watershed management and integrated and participatory approaches for water resources planning, development and management. Additionally, it lays a foundation for sustainable development and management of water resources in the Tanzania.

Commitment: Thus, the execution of the proposed project will abide to the provision under this policy and its associated regulations to avoid in any way the deterioration of water quality for both surface and underground resources for the benefit of the community by putting in place good sanitary facility.

4.2.10. Mineral Policy (2009)

The Mineral Policy of 2009 aims at strengthening integration of mineral sector with other sectors of the economy; improving economic environment for investment. Maximizing benefit from mining; improving the legal environment; strengthening capacity for administration of the mineral sectors; developing small scale miners; promoting and facilitating value addition to minerals; and strengthening environmental management. The National Mineral Policy also addresses that the mining activities that should be undertaken in a sustainable manner. Reclamation of lands after mining activities is recommended.

Commitment: The proponent will use minerals classified as building materials which include stone aggregates and sand. This will promote economic growth but will also ensure that the extraction of construction materials are done in a manner that do not-environmentally contravene the policy provisions.

4.2.11. The Energy Policy (2015)

The policy outlines measures to adopt clean technology and minimize energy losses. The policy states that energy is a prerequisite for the proper function of nearly all sectors of the economy. It is an essential service whose availability and quality can determine the success or failure of development endeavours. The policy seeks to promote energy efficiency in all economic sectors.

Commitment: MUST will promote the objectives of this policy from design perspective of the building to minimize energy uses. Further shall explore the use of clean energy during the project implementation.

4.2.12.The Urban Planning and Space Standards Policy 2012

The policy provides guidance for continuing delivery of a high-quality pedestrian and other people friendly public realm within the city centers to support the economic, social, cultural and environmental attractiveness of the city centers to businesses, residents and visitors. The policy explains more as the management of space is a key foundation of the asset management strategy. Also, the provision of appropriate space is becoming even more important as institutions increasingly competing in urban areas.

Commitment: MUST will plan for proper utilization of project area during its implementation.

4.2.13.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 which deals with the tendencies of private sectors to employ expatriates even where there are equally competent nationals.

Commitment: The proponent and contractor shall promote this policy by employing many Tanzania of relevant qualifications with priority to the community around and special groups as stated by the policy especially during development phase.

4.2.14.The National Women and Gender Development Policy (2000)

This policy aims to improve opportunities for women and men to play their full roles in society, recognizing specific gender requirements. The policy aims to minimize shortcomings related to the limited participation of women in most economic development activities. It focuses on using available resources to increase incomes, eradicate poverty and improve living standards. The policy also recognizes and emphasises creating awareness of how environmental degradation increases poor women's burden.

Commitment: This project will respond to the policy by ensuring equal opportunities in employment during development and operation phases.

4.3. Legal Framework

In addition to the above policies, there are a number of legal and regulatory frameworks that the proposed project must comply with and which this study has taken into consideration. The Environmental Management Act (No. 20), 2004 is the principal legislation governing all

environmental management issues in the country. Within each sector, there are sectoral legislations that deal with specific issues pertaining to the environment. Some of the relevant legislation and regulations that are relevant in the management of the environment include: -

4.3.1. The Environmental Management Act, Cap. 191

The Environmental Management Act (EMA) is a piece of legislation that forms an umbrella law on environmental management in Tanzania. Its enactment repealed the National Environment Management Council Act. 19 of (1983) while providing for the continued existence of the National Environment Management Council (NEMC).

Among the major purposes of the EMA are to provide the legal and institutional framework for sustainable management of the environment in Tanzania; to outline principles for management, impact and risk assessment, the prevention and control of pollution, waste management, environmental quality standards, public participation, compliance and enforcement; to provide the basis for implementation of international instruments on the environment; to provide for implementation of the National Environmental Policy; to provide for establishment of the National Environmental Fund and to provide for other related matters.

Part III, Section 15(a) states that in matters pertaining to the environment, the Director of Environment shall coordinate various environment management activities being undertaken by other agencies to promote the integration of environment considerations into development policies, plans, programmes, strategies projects and undertake strategic environmental assessments with a view to ensuring the proper management and rational utilization of environmental resources on a sustainable basis for the improvement of the quality of human life in Tanzania.

Part VI of the EMA deals with Environmental Impact Assessments (EIA) and other Assessments and directs that an EIA is mandatory for all development projects. Section 81(2) states that "An Environmental Impact Assessment study shall be carried out prior to the commencement or financing of a project or undertaking", while Section 81(3) states "a permit or license for the carrying out of any project or undertaking in accordance with any written law shall not entitle the proponent or proponent to undertake or to cause to be undertaken a project or activity without an environmental impact assessment certificate issued under this Act".

Commitment: The proponent has undertaken this ESIA to ensure the proposed construction of an academic and rural technology park blocks for educational purposes are compliant to this Act by implementing the proposed mitigation measures in chapter 7 and 8.

4.3.2. The Land Act, Cap. 113 R.E 2019

These laws declare all land in Tanzania to be "Public land" to be held by the state for public purposes. The Acts empower the President of the United Republic of Tanzania, to revoke the "Right of Occupancy" of any landholder for the "public/national interest" should the need arise. The laws also declare the value attached to land. The Act seeks to control the land use and clarify

issues pertaining to ownership of land and land-based resources, transactions on land and land administration. The law provides for technical procedures for preparing land use plans, detailed schemes and urban development conditions in conformity with land use plan and schemes. The LGA has the power to impose conditions on the development of any area according to the land-use planning approved by the Minister.

Commitment: This project conforms to this law because it has followed all development conditions provided.

4.3.3. 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. Under Section 3, among others the law seeks to improve level of the provision of infrastructure and social services for sustainable human settlement development. Therefore, the proposed building development is in line with the objectives of this law.

Section 58 of the Urban Planning Act provides for protection of buildings or group of buildings of special architectural or historic interest. The law states "The planning authority may compile a list of areas, buildings or group of buildings of special architectural or historic interest and may amend any list so compiled, such areas may include; buildings, group of buildings, areas of unique biodiversity; and rare species of trees and special trees". Section 59 gives powers to the planning authority to grant permission for demolition of such buildings or otherwise powers to restrain any proposed demolition.

Commitment: This project is in line with this law as the proponent buildings shall be constructed at the area where no relocation of people is needed and also there are no buildings of special architectural or historic interest.

4.3.4. The Land Use Planning Act No. 6, 2007

The Act provides procedures for: preparation; administration and enforcement of the Land Use Plans to facilitate an orderly management of land use. It empowers land occupiers and users to make better and more productive use of lands, to enhance security and equity in accessing land and its resources.

Commitments: The project site is designed educational purpose only and proponent shall not use otherwise. The proponent shall abide to this Act by complying with all legal requirement as directed by Mbeya city council plan. The proponent will also make sure that the project adhered to sustainable land use practices by protecting the environment from pollution degradation and destruction in order to attain sustainable development

4.3.5. The Occupational Health and Safety Act No.5 of 2003

The occupation health and safety Act no.5, 2003 section 73-76, is an act for health and safety different from the regulations provided This Act provide for the protection of human health from occupational hazards. It requires the employer to ensure the safety of workers by providing gear at work place. It specifically demands: the provision of regular medical examination of employees, safe means of access and safe working place; prevention of fire; supply of clean and safe water to workers; sanitary convenience; washing facilities; and first aid facility.

Further the commitments of proponent to provision of PPE, warning signs are articulated hereunder with relevant to the occupation health and safety act no 5, 2003 section 62 which states that in any factory or workplace where workers are employed in any process involving exposure to any injurious or offensive substance or environment, effective protective equipment shall be provided and maintained by employer for the use of the persons employed.

(1) Penalties could be imposed to proponent in case of any injuries or death resulting from reluctantly use of PPE. Where any person is killed or suffers seriously body injury in consequence of the occupier or owner of the factory or workplace having contravene the provisions of this act or of any regulation rule or order made hereunder the proponent be without prejudice to any other penalty be liable to a fine and imprisonment

(2) In any case of injury to health the occupier to health the occupier or owner shall not be reliable to a penalty under this section unless the injury was caused directly by the contravention.

(3) Proponent shall not be reliable to any penalty under this section if a charge against him under this section if a charge against him under this Act in respect of the act or the injury occurred.

Commitments: Proponent shall observe the provision of this Act for the proposed project whereby protective gears during all times of working will be available and ensure protection of human health and safety against any associated risks while working.

4.3.6. The Employment and Labour Relations Act No. 6 0f 2004

This Act guarantees fundamental Labour rights and establishes basic employment standards. The Act provides broad protection against discrimination. Specifically, the Act mandates that employer "promote equal opportunity in employment and strive to eliminate discrimination in any employment policy or practice." It prohibits direct or indirect discrimination by employers, trade unions and employers' associations on a number of grounds, including gender, pregnancy, marital status or family responsibility, disability, HIV/AIDS and age. Harassment of an employee on any of these grounds is equally prohibited. The Act also requires employers to take "positive steps" to guarantee women and men the right to a safe and healthy environment. The Act makes provisions for core labour rights; establishes basic employment standards, provides a framework for collective bargaining; and provides for the prevention and settlement of disputes.

Commitments: Proponent shall see to it that the Contractor adheres to employment standards as provided for by the law.

4.3.7. Engineers Registration Board (Amendment) Act, 2007

The Acts regulate the engineering practice in Tanzania by registering engineers and monitoring their conduct. The Board has responsibilities of regulating engineering activities and the conduct of engineers, engineering technicians and engineering consulting firms in Tanzania.
Commitments: Proponent shall ensure that all projects are registered by ERB and practicing professional own practicing license.

4.3.8. The Contractors Registration (Amendment) Act, 2008

The Contractors Registration Act requires contractors to be registered by the Contractors Board (CRB) before engaging in practice. It requires foreign contractors to be registered by the Board before gaining contracts in Tanzania. Also, the legislation provides powers to the Board to inspect any site for construction works, for the purpose of ensuring that the construction activities are being undertaken by registered contractors and the works comply with the governing regulation of the nation. In case a firm, company, organization, partnership or individual person undertakes construction activation legal action is taken against such acts. In addition to these, the Board ensures that all action is taken against such acts. In addition to these, the Board ensures that all constructions sites hoarded so as to adhere to occupational health and safety regulations.

Commitments: In compliance with the Act, the Proponent will hire a registered consultant firm.

4.3.9. The Architects and Quantity Surveyors Act (2010)

Similarly require architects and quantity surveyors (QS) to be registered with the Board before practicing. Foreign architects and QS should abide by the law.

4.3.10. The HIV and AIDS (Prevention and Control) Act of 2008

The law provides for public education and programmes on HIV and AIDS. Section 8 (1) of the law states that "The Ministry (Health), health practitioners, workers in the public and private sectors and NGOs shall for the purpose of providing HIV and AIDS education to the public, disseminate information regarding HIV and AIDS to the public". Furthermore, Section 9 states that "Every employer in consultation with the Ministry (Health) shall establish and coordinate a workplace programme on HIV and AIDS for employees under his control and such programmes shall include provision of gender responsive HIV and AIDS education"

Commitments: The proponent will observe the provision of this Act by introducing awareness creation programme and sensitization to protect workers and communities around the project area against infection of HIV/AID.

4.3.11. The Local Government Law (Miscellaneous Amendment) Act, 2006

This 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.

Commitments: Proponent shall observe the bylaws set by Mbeya city council.

4.3.12. The Public Health Act 2009

An Act provide for the promotion, preservation and maintenance of public health with the view to ensuring the provision of comprehensive, functional and sustainable public health services to the general public and to provide for other related matters. Section 66 of the Act state that: (1) A building or premises shall not be erected without first submitting the plans, sections and specifications of the building site for scrutiny on compliance with public health requirements and approval from the Authority. (2) A building or premises or its part or any structure shall not be occupied until a certificate of occupancy has been granted. (3) The provisions of subsections (1) and (2) shall not apply to the dwelling houses in the rural areas or houses erected in urban which have been recognized as such under the Squatter Upgrading Programme.

The Act creates obligations for the project proponent for this regard as follows:

- To keep premises free from breeding sites of mosquitoes (Section 30)
- To maintain cleanliness and prevent nuisance (Section 55).
- To manage solid and liquid wastes with the purpose of protecting public health (Sections 73-112).
- To supply safe water and prevent any pollution and contamination (Section 121)

Commitment: Proponent shall observe the provisions of this Act in the execution of the proposed project by ensuring that the public shall not be affected.

4.3.13. The Fire and Rescue Services Act No. 14 of 2007

The Act provides for the better organization, administration, discipline, and operation of Fire and Rescue Force. The Act, Part II section 4 establishes a Fire brigade for the mainland Tanzania (Fire and Rescue Force). Section 5 of the Act provides duties and Functions of the Force. Amongst the functions of the force is to raise public awareness on the prevention and fire services. The force is assigned by section 13 to provide and maintain or cause to be provide and maintained fire hydrants and other water installations as are necessary for securing the best practical use of the available water supply in case of the outbreak of fire. Provisions and maintenance of fire escapes is elaborated in section 22 in which subsection 1-3 go in details and gives requirements to be fulfilled for the safety of buildings.

Commitment: Proponent shall observe the provisions of this Act in the execution of the project by applying and obtaining a valid fire certificate. Also, proponent will ensure fire extinguishers are present in every section and other fire fighting equipment like baskets full of dry sand are available for use in the event of fire fighting. This equipment will be serviced every 6 months for their proper functioning.

4.3.14. The Water Supply and Sanitation Act No. 12 of 2009

Part IV of 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.

Commitment: The proponent shall use clean to water from Mbeya Urban Water Supply and Sanitation Authority.

4.3.15. The Local Government Urban Authorities Act Cap. 288 R.E 2002

Tanzania is implementing the Local Government Reform Programme (which has instituted "Decentralization by Devolution". District and Urban councils have extensive powers under the two acts, both in governance aspects and in the management of natural resources and land in their respective jurisdictions. The administrative aspects of valuation and payment of compensation are assigned to local government authorities' and regional administration.

Commitments: It is on the basis of this Act that, the proponent is determined to ensure continuous conservation of the project site while maintaining environmental and public health safety.

4.3.16. The Workers Compensation Act, 2008

The Act provides for compensation to employees for disablement of death caused by or resulting from injuries or diseases sustained or contracted in the cause of employment. It provides for adequate and equitable compensation for employees who suffer occupational injuries or contact occupational disease arising out of and in the course of their employment and in the case of death, for their dependents; rehabilitation of employees who have suffered occupational injuries or contracted occupational; framework for the effective, prompt and empathetic consideration, settlement and payment of compensation benefits to employees and their dependents; establishment, control and administration of the workers compensation fund and the legal framework for contribution and payment from the fund; give effect to international obligations with respect to workers compensation; and Promote prevention of accidents and occupational diseases.

Commitments: The relevance of this Act to the proposed project is to put emphasis on workers compensation in case of injuries, death, diseases while working. It is therefore a responsibility of the Proponent to ensure that all requirements of this Act and working standards are followed for safe working environment and prevention of accidents and occupational and or related illnesses or diseases.

4.3.17. The Water Resource Management Act. 2009 (Act No. 11/ 2009)

The Water Resource Management Act 2009 is a new 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.

This Act repeals the Water Utilisation Act of 1974 and its subsequent amendments. It provides right to water for domestic uses by any person from any surface water sources and rainwater without a permit as long as no works are constructed for the purpose. The Act indicates the need of a water use permit for any works for water abstractions or water abstraction for uses other than domestic ones. The Act further prohibits discharge of waste streams into any water body including rivers (e.g. small rivers within the project areas) without written permit from the water officer. The Act requires adherence to present environmental standards of receiving water bodies when legally discharging waste waters. The Contractor shall observe this legal provision throughout construction, operation and decommissioning phases.

Commitment: Proponent will design and connect all waste water to anaerobic baffled reactor connect the project to that removes all organic matter and other parameter are removed in wetlands and finally to soak away or irrigation of the fruits and grass.

4.3.18. 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 as a result of these. Section 15 provides details on the power of the Minister for provision of consent for the new construction of such infrastructure. Section 16 provides details on the compensation for land and cut vegetation during road construction. 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.

Commitment: The proposed project will utilise the current public roads and therefore obliged to observe the requirement of this Act.

4.3.19. The Electricity Act No 10 of 2008

This Act provides for facilitation and regulation of generation, transmission, transformation, distribution, supply and use of electric energy, cross border trade in electricity and the planning and regulation of rural electrification.

Section 25 details the relevant Power Purchase Agreements concluded subsequent to the entry into force of this Act. Section 25 (2) A licensee may by rules made by the Authority conclude agreements for the purchase or sale of electricity. This section provides for (among others) agreements relating to electricity purchase and sale in the market determined by the authority, to be competitive Standardized Power Purchase Agreement and Tariff for small power projects.
The primary power supply for the project will be the Tanzania Electricity Supply Businessman (TANESCO).

Commitment: Therefore, proponent shall adhere to the requirement of this Act in the process of the Electricity purchase from TANESCO.

4.3.20. 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.

Commitment: The project proponent will fulfil this legal requirement in all project phases, from design, construction and operation.

4.3.21. The Child Act, 2010

The legal framework for child labour in Tanzania is contained in the Law of the Child Act (Act No. 21, 2009). The Act sets the minimum age for admission of a child to employment at 14 (Sec. 77.2). It also contains a provision permitting light work for children who are at least 12, where light work is defined as work that is not likely to be harmful to the health or development of the child and does not affect the child's attendance at school or the capacity of the child to benefit from schoolwork (Sec.77.3). The Act prohibits the engagement of children and children below 18 in hazardous work, posing a danger to health, safety or morals and in "night work" taking place between 8 pm and 6 am (Sec. 82.2). The Law of the Child (Child Employment) Regulations (G.N. No. 196, 2012), which is used to implement the Law of the Child Act (Act No. 21, 2009), contains list of all hazardous activities in which a child shall not be allowed to work, even on a voluntary basis. Section 82 of the Act also protects children from sexual exploitation. A child shall be

protected from sexual exploitation and use in prostitution, inducement or coercion to engage in sexual activity and exposure to obscene materials.

Commitment: This project will protect against child labour, especially during the construction period.

4.4. Relevant National Plans and Strategies

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

4.4.1. The Tanzania Development Vision 2025

The Tanzania Vision 2025 aims at achieving a high-quality livelihood for its people attain good governance through the rule of law and develop a strong and competitive economy. Specific targets include:

1. A high-quality livelihood characterized by sustainable and shared growth (equity), and freedom from abject poverty in a democratic environment. Specifically, the Vision aims at: food self-sufficiency and security, universal primary education and extension of tertiary education, gender equality, universal access to primary health care, 75% reduction in infant and maternal mortality rates, universal access to safe water, increased life expectancy, and absence of abject poverty, a well-educated and learning society.
2. Good governance and the rule of law moral and cultural uprightness, adherence to the rule of law, elimination of corruption.
3. A strong and competitive economy capable of producing sustainable growth and shared benefits a diversified and semi-industrialized economy, macro-economic stability, a growth rate of 8% per annum, adequate level of physical infrastructure, an active and competitive player in regional and global markets.

MUST is one of the important projects to enable Tanzania achieve its Development Vision objectives notably eradicating poverty. MUST project will contribute to the attainment of the 2025 Vision through provision of adequate skilled labor force for implementing various development plans.

4.4.2. Third National Five-Year Development Plan (FYDP III; 2021/22 – 2025/26)

The Plan is a continuation of Government's efforts in achieving the goals set in the National Development Vision 2025 enduring exertion to further improve the standard of living for all Tanzanians. The main objective of the Third Plan is to contribute to realisation of the National Development Vision 2025 goals. These goals include Tanzania becoming a middle-income country status and continue with transformation of becoming an industrial country with a high human development or a high standard of living. Upon reaching its vision, which have the

following attributes: peace, stability and unity; good governance; an educated and learning society; and a strong economy that can withstand competition and benefit many people. The FYDP III, therefore, will seek to enable the country to more effectively use her geographical opportunities and resources for production and economic growth, while, ensuring that the outcomes benefit all citizens in line with the Vision's goals of a high quality of life. FYDP III will continue to implement the projects and programmes aimed at opening up economic opportunities, build an industrial economy, strengthen competitiveness in domestic, regional and global markets as well as strengthen human development including the education sector. The proposed project supports this development plan by increasing academic, research and innovation opportunities in various geographical areas of Tanzania including Mbeya City Council, Mbeya region where the proposed MUST project will be constructed

4.4.3. The National Plan of Action to End Violence against Women and Children (NPA-VAWC) 2017/18 – 2021/22

From a situation analysis of this plan, violence is a daily reality for large numbers of women and children in Tanzania. The NPA-VAWC recognizes that reducing violence has positive implications for inclusive growth and has ambitious targets that could positively impact the agency of women and girls. The plan aims to dramatically lower rates of teenage pregnancy, reduce the practice of female genital mutilation/cutting (FGM/C), and drastically reduce child marriage throughout the country. The plan incorporates strategies to help local authorities and police, service providers, and communities better provide prevention and response services that have the greatest potential for reducing violence against women and children. To put the plan in action, MUST should with relevant government officials, social welfare officers, religious leaders, and police officers during implementation of the proposed project to end existing Violence against Women and Children.

4.5. Relevant Regulations and Guidelines

4.5.1. The Environmental Management (EIA and Audit) (Amendment) Regulations of 2018

The Regulations have been promulgated to give effect to the provisions of the EMA Cap 191 Section 82 (1) and 230 (2) on how Environmental Impact Assessment shall be conducted.
Prior to the implementation of the project, the Proponent is required (R. 4) to submit a certificate of Environmental Impact Assessment to the licensing Authority. It is an offence under Regulation 60 to conduct project without EIA approval; failure to prepare and submit to NEMC project brief, EIS, Audit or make false statements in the documents. Any Authority is prohibited to issue license / permit without EIA authorization.

The Proponent is tasked with registration of project (Regulation 6, 7); while NEMC assign environmental assessment category to the project using set of screening criteria. Project may fall under List A of projects for which ESlA is mandatory or List B of projects requiring a Preliminary Environmental Assessment. Screening requires (Regulation 8) participation of relevant institutions

or local government environmental management officer or regional secretariat. Regulation 12-17: are requirements for conduct of environmental assessment procedure and steps for undertaking EIA study. Specific requirements include: Scoping and TOR approved by NEMC to guide the EIA study; EIA conducted by registered experts; consideration of social, cultural and economic aspects /impacts of project; and provision of all opportunities for the public (any person who is likely to be affected or any interested party) to participate.

Regulation 18 & 19: Stipulate content and format of EIA reports and Environmental Impact Statement (EIS) including inclusion of a non-technical executive summary in English and Kiswahili languages. Regulation 22 & 28 sets requirements for review of EIA reports by various stakeholders: NEMC / Cross-Sectoral Advisory Committee /relevant Ministries, institutions and general public using stipulated review criteria. Regulations 26 – 28 are provisions for public hearing when deemed necessary.

Minister Responsible for Environment is the only authority empowered to issuing of decision letter on EIS and EIA Certificate for approved registered projects. The regulations allow appeals to Environmental Appeals Tribunal on refusal to grant or transfer EIA certificate, and imposition of other conditions, fees and costs. Minister is empowered to delegate powers of approval of EIS (R. 65). (Part VIII) provides for access to EIS and Information - documents that are outputs of the EIA process are deemed to be public documents accessible to all. Procedures for undertaking Audit for existing development projects and for environmental monitoring and reporting are expounded under Parts X and XI respectively. The proponent shall take all precaution measures to ensure that the proposed project is carried out without harming environment and upon commencement of the business the proponent shall adhere to the provisions of this Act to protect the environment. In accordance to this Act, in case of any pollution as a result of development of the proposed project the proponent shall be responsible to pay for the said pollution.

Commitment: The proponent shall be bound by the above principles, other environmental and sustainable development principles and provisions of the Environmental Management Act 2004 at whole.

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

The Act describes Classification of hazardous wastes in section 8. (1) Hazardous waste shall be classified in accordance with the criteria set out in the Third First Schedule on the basis of listed waste streams, constituents and other wastes to be controlled which are hazardous under Part I of the First Schedule, read with or combined with hazardous characteristics listed under Part II of the First Schedule. Labelling of wastes is important as stated in section 10 (1) that No person shall sell, offer for sale, use, pack or store wastes in a container or package, unless the container or packaging has label written in English or Swahili affixed onto it.

Regulations made under sections 110.128,133,135 and 230 of EMA to control all categories of hazardous waste and to the generation, stage, transportation, treatment and disposal and their movement into and out of mainland Tanzania. Any person generating handling or transporting hazardous waste or exercising jurisdiction under the regulation should be guided by principles of environmental and sustainable development; the precautionary principle; polluter pays principle and the producer extended responsibility (R.4). also, the owner or controller of a facility or premises which generates hazardous and toxic wastes are required to minimize the waste generation through employment of cleaner production principle, i.e. improvements of production process through conserving raw materials principle and energy, and monitoring the product cycle from beginning to end (R.5)

On hazardous waste management, every person living in Tanzania has a duty to safeguard the environment from adverse effects of hazardous waste and inform a relevant authority on any activity and phenomenon generating hazardous waste that are likely to adversely affect environment and human health (R.6)

Regulation 35 directs on electrical and electronic wastes that these wastes should be separated from other type of wastes and disposed separately into receptacles as prescribed by the council or local government and local government should ensure a person who handles these wastes are supplied with appropriate protective gears, trained in safe handling and equipped with waste handling equipment.

Commitments: During project implementation hazardous wastes container will be provided and labelled, also it is the duty of the proponent to make sure the ongoing activities shall abide to these regulations.

4.5.3. The Environmental Management (Air Quality Standards) Regulations 2007

This regulation sets baseline parameters on air quality and emissions based on a number of practical considerations and acceptable limits; enforces minimum air quality standards, directs proponents and operators of such developments as industries to keep abreast with environment from various sources of pollution.

Reg.5 (d) lists specific standards that regulate industrial activities, as prescribed by the NESC with consent on the minister responsible for environment reg. 7(1) calls upon any person in Tanzania to comply with air quality standards, furthermore, reg.8 (1) prohibits any person to emit/release any hazardous substance, chemical, gas or mixture containing gaseous and hazardous substance into the environment unless permitted under these regulations or other written law.

Reg, 21 highlights on the need of taking and analysing samples by the council and laboratories accredited or designated in accordance with the Act; and reg. 22(3) empowers the municipal environment management officer to issue compliance order to air quality standards. However, reg.

25 Cleary confers environmental inspectors appointed or designated to exercise powers, thus, to comply with this regulation,

Commitment: Proponent shall have to undertake air quality monitoring so that incinerator operations do not produce pollutants beyond the given Tanzania limits.

4.5.4. The Environmental Management (Water Quality Standards) Regulations, 2007

The regulation (regulations 16) requires any person undertaking any activity near water sources to consider safe distances of water supply systems from pollution sources. The8th schedule provides a list of those safe distances, regulation 19(1); empowers NEMC to issue permits for discharge of water polluting substances and designate such pollutants.

Sub-regulation 3, empowers LGAs environmental management officers to recommend to the council categories of human activities which they deem to be main polluting activities, regulation 34 directs local government authority to issue guidelines and standards on collection, transportation and disposal of sewage and sludge.

Commitment: Proponent shall observe these regulations by ensuring that waste is properly treated before disposal and that none of the hazardous wastes will be disposed into the environment to contaminate underground/surface water resources

4.5.5. The Environmental (Registration of Environmental Experts and Practicing certificate) Regulations of 2021

Regulations formulated under Section (Section 83) of EMA on undertaking of environmental assessments by individuals and firms registered /certified by Registrar (NEMC). Regulations 14-15 prohibit any person to conduct an environmental impact assessment, audit or related studies unless the person is certified /registered; otherwise, the Council shall not deliberate on such study, statement or audit or project brief. Qualifications of experts are stipulated and R. 24(2) allow registered person to use in any communication the title "Certified Environmental Assessor" or "Certified Environmental Auditor". Rs. 24-26 allow Firms registered under other laws to apply as consulting Firm of Environmental Experts comprised of a multi-disciplinary team. R. 22– 23 establish a Registrar of Environmental Experts at NEMC to maintain a Register.
Commitment: Therefore, this ESIA has been undertaken by MUST.

4.5.6. The Environmental Management (Solid Waste Management) Regulations of 2009

The Regulations requires the Proponent to:

(i) Use receptacles approved by the Council or local government authority;
(ii) Ensure that reusable receptacles are kept clean and maintained in good repair;
(iii) Ensure that each waste receptacle is used in a way which protects the contents from spillage, rain, storm water, birds, flies or other pests and vermin;
(iv) Not burn or cause to be burnt any solid waste at landfill or any other disposal site;

(v) Ensure that plastic materials are separated from non-plastic materials and deposited separately into receptacles as prescribed by local government with respect to recyclable plastic wastes that are stored outdoors ensure that they: are protected from contamination by any dirty materials or chemicals, are secured against and fire-fighting equipment shall be readily available, inform the fire-fighting department in advance of any storage of plastic wastes in a recycling facility; and plastic waste storage facilities shall be situated in areas easily accessed by fire fighting vehicles
(vi) Not to litter in contravention with the Act and Regulations
(vii) Carry out environmental audit in accordance with the Environmental Impact Assessment and Audit Regulations, 2005

Commitment: Proponent shall observe the provisions of this regulation in the execution of the proposed project by ensuring proper management of the solid waste by putting collection bin with labels for sorting and timely disposal.

4.5.7. The Environmental Management (Soil Quality Standard) Regulations, 2007

The Regulations requires proponent to comply among other things with soil quality standards that may be prescribed by the National Environmental Standards Committee. The Proponent shall not:

(i) Pollute the soil
(ii) Discharge any hazardous substance, chemical, oil or mixture containing oil on any soils except in accordance with what is prescribed under these Regulations or any other written law
(iii) Disobey to environmental inspectors
(iv) Violate guidelines or any standards made by local government authorities on collection, transportation and disposal of sewage and sludge.

Commitment: Proponent shall observe the provisions of this regulation in the execution of the proposed project by protecting the soil against any pollution.

4.5.8. Environmental Management (Air Quality Standards) Regulations of 2007

Focus areas of the Regulations include:

(i) Hazardous substance management - R8 prohibits the emission or release of unpermitted hazardous substances, chemicals and materials or gas or mixture into the environment.
(ii) Permissible emission limits for SOX, CO, black smoke and suspended particulate matters, NOX, O_3.
(iii) Permissible quantity of emission of SOX, CO, hydrocarbon (as total organic carbon), dust, NOX or lead.
(iv) Permissible limits of substances found in exhaust of motor vehicles.
(v) Air pollutant emission permit - owner or operator of main air polluting activity is demanded to apply for registration and obtain a permit issued by the NEMC.

(vi) Compliance, protection and stop orders: authorities and power vested in NEMC (environmental inspector) to issue:
(vii) Compliance order for entity bleaching these regulations or condition of a permit; o Protection order against activities likely to result in adverse effect on the air or to the environment or public health (R.23);
(viii) Stop order to any person where satisfied that further delays will occasion more serious harm to human health or living environment.
(ix) Emergency prevention order for prevention of emission into the environment in an amount, concentration or manner that constitutes a risk to human health or environment.

Commitment: The proposed project is thus required to undertake periodic air quality sampling on construction and operations to check on the capacity of the project's compliance with emission limits.

4.5.9. The Environmental Management (Fees and Charges) Regulations, 2021

These Regulations may be cited as the Environmental Management (Fee and Charges) (Amendment) Regulations, 2021, and shall be read as one with the Environmental Management (Fee and Charges) Regulations, 2008 regarded as the Principal Regulations. These regulations were made under section 230 (2) (b) of the Environmental Management Act, 2004 (CAP) 191. The regulations apply in relation to an act or omission to which fees and charges are payable under the Act. It requires that any person who wishes to perform any function related to the prevention, protection, promotion or conservation of environment or to carry on business related to –

(i) Environnemental impact assessment, environmental audit or environmental monitoring;
(ii) Registration as environmental expert;
(iii) Environmental quality standards; or
(iv) Ozone depleting substances,

Hence shall be required to pay the fees prescribed in the Schedule to these Regulations. The fees of which will be collected by the council shall neither be refundable nor transferable.

Commitment: Proponent is aware of the regulations and will be answerable for the charges prescribed in these regulations.

4.5.10. The Urban Planning (Building) Regulations, 2018

The Urban Planning (Building) Regulations shall apply to all planning areas declared by the Minister under section 8 of the Act that means no person shall erect or begin to erect any building until he has:-The permit under sub regulation (i) shall be in Form 2 prescribed in the Fourth Schedule and shall be signed by a structural engineer who will check structural qualities and Registered Town Planner who will check use of land duly designated for that purpose by the planning authority under his hand and shall entitle the holder to erect the building in accordance with the approved plan and subject to all the conditions imposed by these Regulations.

Also, any subsequent modification or alteration that is proposed or necessary to be made in the approved plan shall be submitted to the Authority for approval in the same manner as the original plan and no such modification or alteration shall be made in the construction of the building until it has been approved by the Authority and the particulars thereof endorsed on the original building permit.

Commitment: Proponent shall comply with the regulation by acquiring the building permit from the authority before the commencement of the construction of the proposed buildings.

4.5.11. The Environmental Management (Quality Standards for Control of Noise and Vibration Pollution) Regulations (2015)

Formulated under Sections 140, 147 and 230 of EMA for the control of noise (loud, unreasonable, unnecessary on unusual) and vibration pollution that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and of the environment. Focus areas include:

(i) Noise management by owner of machinery or occupier of facility or premises to control noise and to install sound level meters for the measurements and monitoring sound.

(ii) Noise emission License issued by NEMC Director General to owner or occupier of premises whose work or activity is likely to emit noise in excess of the permissible noise levels

(iii) Compliance order, protection order or stop order issued by NEMC or any other empowered authority when any condition of any license or permit has been breached or

(iv) Prevention orders and improvement notice issued by Environmental inspector to prevent noise and vibration pollution in an amount, concentration or manner that constitute a risk to human health or environment.

(v) The minister may provide a reward to any person who will report an incident of incidental, concealment or inadvertent emission or noise pollution or excessive vibration.

Table 4.1: Maximum Permissible Noise Levels for General Environment

Facility	**Noise limits, dBA (Leg)**	
	Day(6.00am-10.00pm)	**Night(10.00pm-6.00am)**
Hospital, convalescence home, home for the aged, sanatorium and institutes of higher learning, conference rooms, public library, environmental or recreational sites	45	35
Residential building	50	35
Mixed residential with some commercial and entertainment)	55	45
Residential and Industry small scale production and commerce	60	50
Industrial area	70	60

Table 4.2: Maximum Permissible Noise Levels for Vehicles

Vehicles category	**Maximum sound level in dBA**
Passenger vehicle (nine seats)	78
Passenger vehicle (nine seats); maximum permissible mass ≥ 3.5 tones	78
- Engine power of more than 150KW	80
-Engine power of less than 150KW	83
Passenger and goods vehicles –	
-Maximum permissible mass not exceeding 2T	79
-Maximum permissible mass exceeding 2T but not exceeding 3.5 T	80
Goods vehicles; maximum permissible mass exceeding 3.5T	
-Engine power of less than 75KW	81
-Engine power of not less than75KW but less than 150KW	83
-Engine power of not less than 150KW	84

At site, the generator shall be operated in case of power outrage. Apart from this, there is no other expected stationary noise emitting machines at the site considering that vehicles just pass by for neighbouring building. However, proponent comply with the provisions of these regulations by regularly maintaining the generator and air compressor and servicing its air conditions as appropriate and where applicable.

Commitment: The Management Plan for the Noise and vibration proposed as part of this EIA will be adhered to by proponent so that the related impacts are mitigated accordingly.

4.6. Relevant World Bank Environmental and Social Frameworks

4.6.1. Objective of the Environmental and Social Framework

The proposed project will be developed and implemented according to the requirements of the World Bank Environmental and Social Framework (ESF). The ESF sets out the World Bank's commitment to sustainable development. The ESF protects people and the environment from potential adverse impacts that could arise from Bank-financed projects and promotes sustainable development. The ESF enables the World Bank and Borrowers to better manage environmental and social risks of projects and to improve development outcomes. The ESF also places more emphasis on building Borrower governments' own capacity to deal with environmental and social issues.

The ESF offers broad and systematic coverage of environmental and social risks. It makes important advances in areas such as climate change; labour standards; transparency; non-discrimination; social inclusion; public participation; and accountability including expanded roles for grievance mechanisms. The ESF codifies best practice in development policies. It brings the World Bank's environmental and social protections into closer harmony with those of other development institutions; and encourages Client countries to use, and improve, their own national environment and social policies, when these policies are materially consistent with the ESF and supported by adequate implementation capacity. The ESF provides an incentive for countries to develop and build their own environmental and social policies and capacity.

4.6.2. World Bank Environmental and Social Standards

The World Bank Environmental and Social Policy for Investment Project Financing sets out the requirements that the Bank must follow regarding projects it supports through Investment Project Financing. The Environmental and Social Standards set out the requirements for Borrowers relating to the identification and assessment of environmental and social risks and impacts and mitigation measures associated with projects supported by the Bank through Investment Project Financing.

The standards are expected to: (a) support Borrowers in achieving good international practice relating to environmental and social sustainability; (b) assist Borrowers in fulfilling their national and international environmental and social obligations; (c) enhance non-discrimination, transparency, participation, accountability and governance; and (d) enhance the sustainable development outcomes of projects through ongoing stakeholder engagement. The proposed project will apply the ESF. The proposed project will apply the ESF and Table 4.3 below describes the application of the ESSs to the project.

Table 4.3: Application of World Bank's ESSs to the Proposed Project

Environmental and Social Standards (ESSs)	Yes/No	Application
ESS 1: Assessment and Management of Environmental and Social Risks and Impacts	Yes	The site-specific environmental and social impacts will be managed through this report. The report has been prepared to recommend Environmental and Social measures to be incorporated into designs and implementation of the proposed project
ESS 2: Labour and Working Conditions	Yes	Workers will be contracted for the construction works and operation of the project. In order, to ensure fair treatment of workers, the project will ensure that terms and conditions of employment (hours, rest periods, annual leave, non-discrimination, equal opportunities and workers organizations) are aligned with the requirements of Tanzania law and ESS2. To protect workers appropriate Occupational Health and Safety (OHS) shall be applied to avoid the risk of ill health, accidents and injuries. The proponent will set labour management procedures with roles and responsibilities for monitoring primary suppliers. If child labour or forced labour cases are identified, the proponent will require the primary supplier to take appropriate steps to remedy them. Where remedy is not possible, the proponent will, within a reasonable period, shift the project's primary suppliers to suppliers that can demonstrate that they are meeting the relevant requirements of this ESSs.
ESS 3: Resource Efficiency and Pollution Prevention and Management	Yes	The project activities will involve construction works which will generate dust, pollutant gases, erosion, wastes (solid and liquid) that will be properly managed via ESMPs and EMP. More or less similar impacts are likely to be experienced during operation phases and will be managed by the same tools as well as operation and maintenance plans.
ESS 4: Community Health and Safety	Yes	The project will not have substantial risk to community health and safety. Only localized negative impacts (like dust emissions noise pollution etc.) to sensitive receptors will need to be managed along the route for collection of construction related materials.

Environmental and Social Standards (ESSs)	Yes/No	Application
		Also, community safety especially is an issue of concern due to the influx of the project workers, and later on participants of the project, which might lead to GBV/ SEA/SH, as well as transmission of HIV/AIDs and other communicable diseases. Guidance on HIV/AIDs, COVID-19, GBV/SEA/SH and HEET project GRM shall be followed.
ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	No	This ESS5 is not relevant to the proposed project as MUST is a legal owner of the plot No.144/2 Block 'A' at Kianda area (Tittle Deed No. 660-Rukwa) specified for education purposes only, with Use Group 'K' use classes (d) as defined in the Urban Planning (use Group and Use Classes) (Use Classes) Regulations,2018.
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	No	The project is not located inside or near protected areas and sensitive habitats. In case the project will purchase natural resources commodities such as timber, it will be important to establish the source area and to have a mechanism in place to ensure that the Primary Suppliers are not significantly impacting sensitive ecosystem or degrading natural habitats.
ESS 7: Indigenous People/ Sub- Saharan African Historically Underserved Traditional Local Communities	No	This standard is not considered relevant as the project will mainly be implemented in areas where communities that meet the requirements of ESS7 are generally not available in the area.
ESS 8: Cultural Heritage	No	This ESS is not relevant as the project area has already being developed.
ESS 9: Financial Intermediaries	No	This ESS is not relevant to the project.
ESS 10: Stakeholder Engagement and Information Disclosure	Yes	The proponent 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. As part of ESIA study stakeholders' engagement has been done in line with the requirement of the ESS10.

4.6.3. Assessment and Management of Environmental and Social Risks and Impacts (ESS1)

This Environmental and Social Standard is applicable to this project due to its potential adverse social and 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, MUST 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. According to social relation that has started to develop between MUST and the nearby surrounding communities, the social services like playing grounds, churches, mosques and accommodation facilities within and outside the campus to be built MUST can be pressurized due to the increased students' enrolment. Thus, the current social services provision at the nearby communities needs to be rechecked in order to prevent pressure on local accommodation and rents.

4.6.4. 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. In order to comply with the provisions of ESS2, MUST will take workers' 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, health and safety standards to minimize impact on workers and the surrounding communities. The ESIA contains robust procedures for workers' safety, requiring plans for accident prevention as well as the health and safety of workers and surrounding communities, which are also part of contracts for works.

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

Contractors, primary suppliers and sub-contractors shall ensure equal employment opportunities that do not discriminate anyone on the basis of colour, nationality, tribe, social origin, political

opinion, religion, gender, pregnancy, marital status/family responsibility, disability, HIV/AIDS and age.

MUST will ensure zero tolerance on workplace sexual harassment of any nature by workers directly hired or project workers engaged through contracts/subcontracts companies, and those confirmed to be guilty will be subject to disciplinary action, including summary dismissal.

4.6.5. Resource Efficiency and Pollution Prevention and Management (ESS3)

This ESS sets out the requirements to address resource efficiency and pollution prevention and management throughout the project lifecycle. In order to ensure efficient use of resources, MUST projects will source construction materials from authorized sources and water from MBEYAUWSA throughout the project implementation. MUST has a total area of 490Ha (4,900,000m2) but the developed area is approximately 10% of the total area. The proposed new buildings are expected to utilize a maximum of 0.4% (20438 m2) of the total plot size. The CO2 generated per year from main sources like cafeteria, vehicles and generator will be sequestered by the available green spaces. Moreover, the project will utilize the pollution prevention and emergency response plan developed 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.

4.6.6. Community Health and Safety (ESS4)

The ESS requires beneficiary to avoid or minimize safety and health risks and impacts of the project, with particular attention to people who, because of their particular circumstances, may be vulnerable. Implementation of project components has the health and safety risks and impacts on project-affected communities. These risks and impacts could include increased rates of crime, and social conflict and violence, increases in traffic accidents, increased pressure on local accommodation and rents, increased transmission of HIV/STDS, as well as increases in gender-based violence. The project will ensure compliance with laws' requirement regarding the COVID-19 situation. MUST 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 as per instructions from the Mbeya City Council Environmental officers.

In order to ensure safety during project implementation MUST 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 Health and safety signage shall be put in place to warn on potential dangers associated with trespassing or accessing the enclosure with no permission. The

ESIA process shall contain robust procedures for accident prevention as well as the health and safety of project affected communities.

4.6.7. Stakeholder Engagement and Information Disclosure (ESS10)

Effective stakeholder engagement improves the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation. The proposed project has engaged stakeholders as per SEP developed for HEET project. The engagement will cover all phases of the project. Implementing agencies will provide stakeholders with timely, relevant, understandable and accessible information, and consult with them in a culturally appropriate manner, which is free of manipulation, interference, coercion, discrimination and intimidation. See chapter five for comprehensive Stakeholders Engagement Plan for this project

4.6.8. 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. Specific guidelines which will be used is Environmental, Health, and Safety (EHS) Guidelines: Environmental Waste Management. As stipulated earlier the guidelines will be used together with the Environmental, Health, and Safety General Guidelines.

The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them. The applicability of the EHS Guidelines will be tailored to the hazards and risks established for the project in accordance to the proposed project activities. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of technical feasibility. The applicability of specific technical recommendations will be based on the professional opinion of qualified and experienced persons. This study will fully consider the WB guidelines to manage the project risks and impacts.

4.7. Relevant International Agreement, Convections and Treaties

4.7.1. United Nations Framework Convention on Climate Change (1992)

The objective of the United Nations Framework Convention on Climatic Change (UNFCCC) is to stabilise the concentration of greenhouse gas (GHG) in the atmosphere, at a level that allows ecosystems to adapt naturally and protects food production and economic development. Article 4 commits parties to develop, periodically update, publish and make available national inventories of anthropogenic emissions of all GHGs not controlled by the Montreal Protocol (by source) and inventories of their removal by sinks, using agreed methodologies. It commits parties to mitigate GHG as far as practicable. Since Tanzania is a Party to the Convention, she will have to account for all sources of GHG in her future National Communications. Undertaking of this ESIA study will enable the country to identify some of the GHG that will be emitted by the project activities. Commitment: MUST management will abide with the requirements on control and prevention of greenhouse gases by emphasizing use of electronic materials copies during teaching and learning.

4.7.2. International Labour Organisation (ILO) Conventions

International Labour Organisation (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. 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.

Commitment: As the conventions have been adopted by the Tanzania Government, MUST project will abide by them and ensure that no child labour is practised throughout the project and workers work in safe environment.

4.7.3. Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention)

The Ramsar Convention provides a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. A total of 2,040 wetlands sites covering over 193.4 million hectares are under Ramsar. Tanzania became a signatory to the Ramsar convention in 1999, when the country designated four wetlands under the convention. The Convention's mission is to ensure conservation and wise use of wetlands at both the national and international levels. It calls upon Contracting Party States to designate wetland sites for inclusion in the list of wetlands of international importance and to establish nature reserves in wetlands and promote their wise use. The Convention also calls upon the Party States to integrate wetland restoration into their national nature conservation, land use and water management policies.

Commitment: MUST project will ensure that the environmental resources are managed well by ensuring, among other things, that there is improved management and conservation of wetlands.

4.7.4. Convention on Biological Diversity (CBD)

The objectives of the Convention on Biological Diversity (CBD) are to conserve the biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resource. Tanzania signed the CBD in 1992 and ratified the same on 8 March 1996. On CBD, Tanzania is obliged to:

a) Develop appropriate national strategies, action plans and programmes for the conservation and sustainable utilisation of its biological resources; and integration of these into relevant sectoral or cross-sectoral plans, programmes and policies (article 6 of the Convention);
b) Build capacities for research, assessment, identification, evaluation and monitoring of biodiversity at the national level with full support and participation of local communities (articles 7,12,13 and 14 of the Convention);
c) Collaborate internationally in transfer of technology, handling of biotechnology and other scientific linkages (articles 15,16,18 and 19 of the Convention);
d) Exchange information relevant to conservation and sustainable use of biological diversity as provided under Article 17 and present national reports to the conference of parties (articles 23 & 26 of the Convention); and
e) Provide financial support and incentives for national biodiversity programmes whereby developed countries shall provide or meet incremental costs as financial topping-up of budgets for biodiversity programmes in developing countries (articles 20 & 21 of the Convention).

Commitment: MUST project in compliance to the convection ratified by the government of Tanzania shall build capacities for research, assessment, identification, evaluation and monitoring of biodiversity with participation of local communities. It will also collaborate in international transfer of technology and other scientific linkages.

4.7.5. Regional Convention on the Recognition of Studies, Certificates, Diplomas, Degrees and other Academic Qualifications in Higher Education in the African States, adopted at Arusha on 5 December 1981

Article 1 stipulates that for the purposes of this Convention the "recognition" of a foreign certificate, diploma, degree or other academic qualification of higher education means its acceptance by the competent authorities of a Contracting State and the granting to the holder of the rights enjoyed by persons possessing a national certificate, diploma, degree or academic qualification with which the foreign one is assessed as comparable. Such rights extend to either the pursuit of studies or the practice of a profession, or both, according to the applicability of the recognition.

(a) Recognition of a foreign certificate, diploma, degree or other academic qualification with a view to undertaking or pursuing studies at the higher level shall entitle the holder to enter the higher educational and research institutions of any Contracting State under the same conditions as those applying to holders of a similar certificate, diploma, degree or other academic qualification issued in the Contracting State concerned.

Article 3 stipulates that for the purposes of the continuation of studies and immediate admission to the subsequent stages of training in higher educational institutions situated in their respective territories, the Contracting States recognize, under the same conditions as those applicable to local academic qualifications, secondary school leaving certificates issued in the other Contracting States, the possession of which qualifies the holders for admission to the subsequent stages of training in higher educational institutions situated in the territories of those Contracting States, provided the applicant satisfies or is given the opportunity to meet the requirements pertaining to the academic level prescribed for admission into those subsequent stages of training in higher education.

Commitment: MUST project in compliance to the agreement ratified by the government of Tanzania shall enrol students from different Contracting State possessing qualifications as stated by the agreement to the stage of education as per their qualifications.

4.8. Institutional Framework for the Management of Environment

4.8.1. Overall Management Responsibility

The institutional arrangement for environmental management in Tanzania is well spelt out in the EMA (2004). There are seven (7) institutions mentioned by the Act, of which the Minister Responsible for the Environment is the overall in-charge for administration of all matters relating to the environment.

Part III, Section 13(1) of EMA (2004) states that the Minister responsible for environment shall be in overall in-charge of all matters relating to the environment and shall in that respect be responsible for articulation of policy guidelines necessary for the promotion, protection and sustainable management of environment in Tanzania.

The legal institutions for environmental management in the country include;

- National Environmental Advisory Committee;
- Minister responsible for Environment;
- Director of Environment;
- National Environmental Management Council (NEMC);
- Sector Ministries;
- Local Government Authorities (City, Municipal, District, Township, Ward, Village, sub-village “Mtaa and Hamlet”)

The Environment management Act cap 191 and Environmental Impact Assessment and Audit regulations of 2005 both emphasizes on administrative framework and institutional arrangement for management of environmental issues in Tanzania and thus outlines responsibilities of different relevant institutions in projects. In this regard, construction of the proposed project will involve both the central government and government agencies (such as the ministry of Lands, Housing and

Human Settlements Development, the Vice President's Office particularly the Directorate of Environment, National Environment Management Council, Occupation Safety and Health Authority (OSHA) and Local Government Authorities (Mbeya Region, Mbeya city council, and lastly Iyunga ward). Table 4.4 outlines institutions and their respective responsibilities regarding this study.

Table 4.4: Key Institutions to the EIA Process

Level	Institution	Role and responsibility
National Level	Vice President's Office-Division of Environment	• Advices the government on issuance of EIA certificates
	Vice President's Office-NEMC	• Supervise and regulate all EIA and environmental audit related matters; • Review and recommend for approval of EIA and environmental audit statements; • Enforce and ensure compliance of the national environmental quality standards; • Ensures that environmental management monitoring plans are implemented by the project proponent TOR, Review of EIA; • Initiate and evolve procedures and safeguards for the prevention of accidents which may cause environmental degradation; and • Render advice and technical supplier, where possible to different stakeholders
	Ministry of Education Science and Technology	• Issuing policy guidance • Providing legal frameworks • Issuing licenses, provisions of certificates of compliances • Enforcement of laws and regulations • Project monitoring.
	Ministry of Lands, Housing and Human Settlements Development	• Issuing of right of occupancy;
	Occupational Safety and Health Authority (OSHA)	• Issuing certificate of compliance • Monitoring Health and Safety of workers in working premises

Regional level	Mbeya Region	• Oversee and advice on implementation of national and regional policies at regional level; • Oversee enforcement of law and regulations; and • Enforcement of laws and Regulation on water and Sewage system in the proposed project site
District level	Mbeya City Council	• Chief Executive officer for all development activities in the city level; • Oversee and advice on implementation of national policies at City level; • Oversee enforcement of laws and regulations provides guidelines for management of land within project area and area of influence; and • Advice on implementation of development projects and activities at City level
Ward Level	Ward Executive officer, Ward Environment and Health Committee	• Oversee general development plans for the ward; • Provide information on local situation and extension services; • Watchdog for the environment, security and other community matters; and • Project monitoring and reporting on environmental performance
Community Level	Local Community around the project site	• Information on local social, economic environmental situation; • View on social-economic and cultural value of the sites and Market operations; • Rendering assistance and advice on the implementation of the project; and • Project monitoring (watchdog for the environment, ensure wellbeing of residents and participate in project activities)
The Proponent	Mbeya University of Science and Technology	• Project concept on EIA study; • Project day-today environmental management and monitoring; • Project implementation; and • Environmental internal auditing

4.8.2. MUST Project Implementation Unit (UPIU) Team and its Capacity

MUST's Project Implementation Unit (PIU) has been established. It has a total of 242 members. Out of this, there is one environmentalist, one social and one gender experts locally known as ESS Team. At the project level both contractors and a Consultant have been guided in the contracts to

employ experts in environment, social and gender. The Environmental and Social Safeguard Team will make sure that this is implemented. The ESS Team is involved in SE, providing inputs in all ToR and contracts for procurement of contractors and consultants. It has also developed GRM which is operational as well as developed an ESS Office. There is also a suggestion box. The rest PIU members include Coordinator, Deputy Coordinator, Infrastructural Development (41), Capacity building (8), Curricula development (144), Finance (5), ICT (9), Procurement, Monitoring and Evaluation (11), Industrial linkage (10) and Communication officers (3). A high proportion of PIU members have been appointed based on their expertise and thus their contribution to this project is based on their expertise.

This ESIA has consulted most of these institutions at various stages as part of this ESIA undertaking and their views and concerns have been incorporated in the report. Key institutional arrangement for HEET Project Implementation is stipulated. Table 4.5 summarizes responsibilities for each institution involved in ESIA.

Table 4.5: Key Institutions for Implementation of the Project

Level	Institution	Roles and Responsibility
Financing Agency	World Bank	● Review sub-project screening including risk level categorization; ● Review the ESIAs, ESMPs and site specific ESMPs; ● Review quarterly reports by the implementing agencies; ● Monitor compliance with the ESMF; and ● Undertake implementation support missions.
Ministry	MoEST (NPIT)	At the national level, NPIT to oversee key project functions including: • project coordination, • procurement, • financial management (FM), • and M&E.
VPO	NEMC, Division of Environment	● Co-ordinate Environmental Management Policy, Act and guidelines ● Approval of ToR, Review of ESIA ● Environmental monitoring and auditing ● Advises Government on all environmental matters
	Minister for Lands, Housing and Human Settlements Development	● Issuing rights of occupancy, ● Overseeing land use planning and issues relating to compensation and physical and economic resettlement (if any)

Level	Institution	Roles and Responsibility
		• Valuation and compensation
	Ministry of Water Basin water Officers	• Responsible for issuing water use permits, • Enforcing laws and regulation of water quality and utilization, as well as permitted discharge levels. • Co-operate between sectors at the local level. • Resolve conflicts between water users
Regional Authorities	Regional Commissioner's Office District Executive Director Office • Functional Departments – Planning, Water, Health, Community Development, Natural Resources, etc.	• Issuing relevant permits • Land ownership and road reserves, current land uses, neighboring activities and developments • Relevant permit, official public notices
District /local level	Land Allocation Committee	• Land approval
	District/Ward Functional Departments – Planning, Water, Health, Community Development, Natural Resources, etc.	• Extension Services • Key stakeholder in project implementation
	Environmental Committees	• Project Monitoring (Watchdog for the environment)
	Ward Development Committee	• Project Monitoring
	Local Stakeholders	• Project Monitoring
Water Basin Board	Lake Rukwa Basin Water Board – Ground water source	• Managing and maintaining sewerage networks • Managing and maintaining of water supply networks • Ownership of utilities within the road reserves • Placing, managing and relocating utilities on, over within or along the proposed project route

Level	Institution	Roles and Responsibility
TANESCO Regional Level	TANESCO Regional Office	• Power supply
EWURA National Level	Energy and Water Utilities Regulatory Authority	• Setting of the tariffs and charges • Monitoring performance and standards with regards to quality, safety, health and environment
Project Proponent - MUST-UPIU	MUST HEET Project has established a Project Implementation Team (PIT) as stipulated in POM 2021 which states that Each PIU will be headed by a Project Coordinator/Leader and have staff responsible for FM, procurement, environmental and social safeguards, and M&E. However, according to MoEST letter of 2021 14 specialists were required to be appointed to form a PIT. Accordingly at MUST 18 staff have been appointed by the Accounting Officer (VC) and issued letters of appointments including roles and responsibilities: They include: • Coordinator • Deputy Coordinator • Other specialists include: • Environments • Social • Gender • Infrastructure • Capacity building	Overall, PIT main task is oversee Project implementation involving development of ToR for consultants and contractors, developing specifications and performing procurement process for equipment and facilities, procurement of consultant and contractors, meeting regularly for assessment of project development, providing specifications for ICT procurement and related facilities, overseeing and implementing capacity development, developing curricula, establishing and working with Industrial Advisory Committee conducting capacity building for its members and undertaking M&E of the project. **Roles and responsibilities of ESS Team** • Capacity building for GRM focal persons and members of the Grievance Redress Integrity includes • Oversee project implementation including mitigation measures through contractors • Ensure environmental compliance by the environmental standards. • Liaise with the DoE and the NEMC on matters involving the environment and all matters with respect to which cooperation or shared responsibility is desirable or required. • Oversee the preparation of and implementation of all ESIA"s required for the project • Monitoring the implementation of HEET Project as per POM and PAD.

Level	Institution	Roles and Responsibility
	• Curricula (2) • ICT (2) • Communication • Industrial linkage • Procurement • Finance • Monitoring and Evaluation (2) The Environmentalist, Social sand Gender specialists, referred to as ESS Team, are part of the PIU Team. PIU Team has competence in performing the implementation of the project and ESIA duties through ESS Team acquired both through learning and practical experiences. PIU Members have attended several capacity building conducted by MoEST and WB.	• Attend meetings and provide guidance in the bid documents developed by PMU to ascertain that the different challenges identified and duly covered from risk for each sub-project/activity • The ESS Team also support the procurement officer in making sure that the bidding documents clearly cover the health, safety and environmental component with appropriate provisions of the same for the contractors to bid. • The ESS Team coordinates the preparation of ESIA and environmental and social management plans (ESMPs) done by consultant and site-specific ESMPs (SSESMP). • They ensure that contractors have an Environmental Health and Safety Officer (EHS), is familiar with the compliance requirements, including WB EHS guidelines. • To review progress reports by the supervision engineer/consultant during civil works and conduct inspection of the sites regularly • To make sure the Contractor complies with the WB guidance on Community Health and Safety and Gender-Based Violence
	Design Consultants	• Understand the sub-project setting and site-specific requirements with discussions with the PIU; • Incorporate the issues identified in the ESIAs, ESMPS into the project design • Provide cost estimates for implementing the design requirements.

Level	Institution	Roles and Responsibility
	Occupational Safety and Health issues	● Perform hazard identification ● Hazard assessment and management ● Risk assessment and management ● Emergency preparedness plan and Response ● Risks and crises management ● Stakeholder engagement and grievance management, including in relation to the worker grievance mechanism, for the social and environmental staff.
	Supervision Engineer/Consultant	● Assist the PIU to ensure that the necessary environmental, health and safety authorizations and permits have been obtained; ● Maintain open and direct lines of communication between the PIU and contractor(s) with regard to environmental matters; ● Review and approve the contractor's site-specific construction ESMPs (CESMP), Health and Safety, Labour Management Plans and Traffic Management Plans together with the PIU; Conduct regular site inspections of all work areas to ensure compliance with CESMPs and E&S specifications for contractors Assist the contractor in finding environmentally responsible solutions to problems; ● Instruct the contractor(s) to take remedial actions within a specified timeframe, and carry out additional monitoring, if required, according to the contractual requirements and procedures in the event of non-compliances or complaints; ● Instruct the contractor(s) to stop activities which generate adverse impacts, and/or when the contractor(s) fails to implement the ESMP requirements / remedial actions; ● Provide training to the contractor on the EHS requirements to be followed; ● Monitor the contractor's environmental awareness training program for all personnel working onsite; ● In case of any accidents or incidents, immediately notify the PIU and support the process of documenting and reporting the case to the WB; ● Prepare written reports for the PIU such as weekly report of non-compliance issues;

Level	Institution	Roles and Responsibility
		summary monthly report covering key issues and findings from supervision activities; and consolidated summary report from contractor's monthly report.
	Contractor	● Compliance with relevant environmental and social legislative requirements (project-specific, district- and national level), including allocating adequate budget for implementation of these requirements; ● Work within the scope of contractual requirements and other tender conditions; ● Prepare CESMPs based on the ESMP in the bidding documents and contracts; ● Train workers about EHS (including relevant WBG EHS Guidelines) and the site- specific environmental and social measures to be followed; ● The EHS officer of the contractor will participate in the joint site inspections with the PIU and Environmental Supervision Engineer/consultant; ● Carry out any corrective actions instructed by the Supervision Engineer/consultant; ● In case of non-compliances/discrepancies, carry out investigation and submit proposals on mitigation measures, and implement remedial measures to reduce environmental impact; ● Propose and carry out corrective actions in order to minimize the environmental impacts; ● Send weekly reports of non-compliance to the Supervision Engineer/consultant; ● Send monthly progress reports to the Supervision Engineer/consultant.

The objective of Environmental and Social Assessment (ESIA) is to ensure that projects are environmentally sound and sustainable, and that decision-making is improved through appropriate

analysis of actions and mitigation of their likely adverse impacts. ESIA is important because MUST will have environmental risks and impacts in core, immediate area and area of influence.

4.9. Key players in implementing the ESMP

To ensure the sound development and effective implementation of the ESMP, it will be necessary to identify and define the responsibilities and authority of the various persons and organizations that will be involved in the project. The following entities will be involved in the implementation of this ESMP:

i) Funding Institution
ii) MUST
iii) National Environmental Management Council (NEMC)
iv) Contractor;

4.9.1. Funding Institutions

The funding organization will have an overarching responsibility to ensure that the project is carried out to the highest environmental standards strictly in accordance with the ESMF and ESIA project report and the mitigation measures set out therein. Additionally, the funding Institution requires that environmental and social impacts are managed in accordance with the World Bank ESF and its ESS.

4.9.2. MUST Main Campus

The proponent responsibility is to ensure that the implementation process of the ESMP and Mitigation measures are line with the relevant national policies and legislations and World Bank Environmental and Social Standard (ESS1). MUST has the Project implementation Team (PIT) responsible for supervision and monitoring the implementation of the project construction activities. The management of all project activities during operation is under the PIT, in collaboration with other departments and units depending on the nature of the activity. In general, the PIT falls under the management of the MUST executing day-to-day activities in the project. The PIT is guided by management meetings that are chaired by the Deputy Vice Chancellor. The management meetings provide support, guidance and oversight of the progress of the PIT. Further, the PIT will designate among PIT staffs an Environmental and Social Safeguard Specialist(s) who will monitor the implementation during the construction and operation phases of the project. The PIT team has enough staffs with capacity to undertake the required monitoring and supervision roles to include Environmental and Social specialists.

4.9.3. NEMC

NEMC is charged with the overall role of providing oversight regarding monitoring for all project activities that have potential impacts on the environment. NEMC will undertake periodic monitoring of the project during the mobilization, construction and operational phases to ensure that the mitigation measures set out in chapter 8 of ESMP are fully implemented. In respect to this

project, NEMC has a specific role of monitoring and ensuring that the mitigation measures are fully implemented as per certificate conditions (to be issued). It will ensure that its Zonal staff are fully trained and equipped to perform its monitoring role. It will review the results of any monitoring and Audit reports generated as part of the project implementation phase and will issue directives based on the monitoring activities to ensure full compliance with the mitigation measures required and address any issues that may arise.

4.9.4. The Contractor

The project will be implemented by a Contractor and will be responsible to MUST for constructing 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 the ESMP. It is recommended 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 nominate a Project Environmental Site Officer (ESO) and Project Social Site Officer (SSO) who will be the Contractor's focal point for all environmental and social matters. The ESO 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 MUST Safeguard specialist on the level of compliance with the ESMP achieved by the contractor regularly 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.

CHAPTER FIVE

5. STAKEHOLDERS' ENGAGEMENT

5.1. Introduction

Stakeholder engagement is the continuous and iterative process by which the project beneficiary, communicates, and facilitates a two-way dialogue with the people affected by its decisions and activities, as well as others with an interest in the implementation and outcomes of its decisions. It considers the different access and communication needs of various groups and individuals, especially those more disadvantaged or vulnerable, including consideration of both communication and physical accessibility challenges. The stakeholders' engagement under this construction project of MUST Rukwa Campus was conducted for the following reasons;

(i) To identify stakeholders and build and maintain a constructive relationship with them, in particular project affected parties;

(ii) To enable stakeholders' views to be considered in project design and environmental and social performance;

(iii) To assess the level of stakeholder interest and support for the project and to enable stakeholders' views to be considered in project design and environmental and social performance;

(iv) 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; and

(v) To provide project affected parties with accessible and inclusive means to raise issues and grievances and allow MUST to respond to and manage such grievances

5.2. Stakeholder Identification and Analysis

The study identified stakeholders to be consulted and involved throughout the project life cycle. Stakeholders' identification in this study was done through a continuous and comprehensive brainstorming process to collect an exhaustive list of people/ groups or institutions that are likely to be affected by the project, affect the project, and influence the direction of the project or those having interest over the project. Table 5.1 shows stakeholders identified and level of interest.

Table 5.1: List of Stakeholders Identified, their Roles and the Rate of Interest in the Project

Authority	Role of the stakeholder	Rate of Interest
Rukwa Regional Administrative Secretary	Political and administrative issues	HIGH
Sumbawanga District Council	Overall advice on both professional works (land, Planning, environments, social, economics) with regards to the execution of the project at MUST-Rukwa Campus	HIGH
Tanzania Commission for Universities (TCU)	Provides advice on all work-related safety measures to the project	MEDIUM
Occupational Safety and Health Authority (OSHA)	Oversees the provision, availability and control of power in the project area at Rukwa Campus	LOW
Tanzania Electricity Supply Company (TANESCO	Power supply	HIGH
Rural Water and Sanitation Agency (RUWASA)	Plan, design, construct and supervise rural water supply projects	HIGH
Fire and Rescue Force	Responsible for fire resuce in the project	LOW
Lyangalile Ward	Beneficiaries of the new campus in Rukwa	HIGH
Local Government Members and Community Members of Kianda village	Providing information to inform environmental and social plans, baseline information and representation of various groups at local level.	HIGH
NON-STATE ACTORS (NGOs, CBOs, FBOs) and PRIVATE SECTOR	Employment opportunities associated with project	HIGH
Rukwa campus students	Building users	HIGH
Rukwa campus staff	Building users	HIGH

5.3. Stakeholder Engagement Approach during Preparation Phase

During this period the consultations, presentations and discussion with the above-identified stakeholders were conducted. In the presentations, the team shared with these stakeholders timely, relevant, understandable and accessible information in a culturally appropriately manner free of manipulation, interference, coercion, discrimination and intimidation. During this stage, the team collected the views and opinions on project design, risk, and impact and mitigation measure

associated with the Project. The stakeholders view and concerns are summarized in Table 5.2 and detailed in appendix II, III, IV and V.

Table 5.2: Summary of Stakeholder Views and Concerns

Issues /Question from Stakeholders	**Discussion /Response**
Perceived Negative Issues	
Social conflicts emerging from interaction following the increased population.	This can be caused by transformation of some of cultural values as indigenous and outsiders interact. The resultant of such interaction may be contrary to the expectation of the local society. This may entail changes in the life style in a way that can be abusive to the indigenous lifestyle. However, there could also be go outcome of the transformation. There it was agreed that the stakeholder should by any means suppress the vices while accepting the good values brought by the changes.
People living in the vicinity of the project site are given first consideration for employment.	Local leaders, such as the CEO, MEO, and chiefs, should be involved in the recruitment of local labourers because they know their people best.
Increased pressure on social services and utilities	• Construction of underground water reserve tank and introducing rainwater harvest system to the nearby villages • Conservation of the water catchment area by training individual to involve in bee keeping as alternative source of income. • Alternative measures like use of solar power, developing water recycling technologies to reduce wastage that can also become the source of pollutants to the surface water sources. • To minimize the energy consumption, the use of energy savers bulbs shall be given high priority. • The design shall consider the parameter of weather condition of the place by putting adequate ventilation system that will maximize natural ventilation hence reducing the need for installing air conditioners.
Disruption of the cultural value, moral and ethics of the local community because of the influx of people with different upbringing	Public seminars on health and social issues should be conducted in churches, classes and other public gathering to sensitise people on the good social practices.

Issues /Question from Stakeholders	Discussion /Response
Perceived Negative Issues	
Emergence of theft issues: Influx of people with different behavioural background may result into increase of misconduct cases including theft incidences	Despite of using seminars to transform the behaviour of some individuals, establishment of security system will be part of redressing the problem.
Spread of communicable diseases: Stakeholders were of concerns that interaction due to increased people during all phases of the project implementation, may increase susceptibility to health problems especially COVID-19, HIV/AIDS, and Sexual Transmitted Diseases.	The environmental and social management plan incorporates seminars programmes for sensitising people on taking precaution about HIV/AID, STDs transmission and spread of COVID 19.
The stakeholders showed also concern about the safety of workers during all stages of project implementation	It was agreed that the workers should be given all the required safety gears and the education on how to protect themselves against accidents.
If drainage system is not well-designed water runoffs may become a problem to the settlement of local people and the water sources.	The designing of the building must consider the terrain of the site and incorporate drainage systems which take the water to appropriate places
Perceived Positive issues	
Business expansion over the place	The project site will provide good opportunity for the local food vendors, retail sellers of various commodities, services provision and another pet trading. It is the role of the local people to secure capital and make use of the coming opportunities
The local people can get access to the agricultural technologies the university is going to produce through its research.	The university should make outreach study to see the real problems in the rural areas so as they develop technologies that applicable to the real life of the local people.
The land scape and social amenity is going to change	The design will consider all the architectural aspects to make the place real attractive

Issues /Question from Stakeholders	Discussion /Response
Perceived Negative Issues	
such that it can form another tourist attraction in the region	
It will lead to improvement of the agricultural production through consultation to the readily available researchers at the university.	The farmers and the researchers must work collaboratively to enable researchers realise the actual need of the farmers so as to develop technologies that fit well to their demand
The project will provide employment opportunities to the people around throughout its implementation phases	For the basic skilled or unskilled labour local people will be given priority
The implementation of the project will be a motive towards development of social services such schools and health facilities for the community around	As part of the social responsibility, the contractor may make some contribution to the development activity of the community around
The project should foster dissemination of basic skills and technology to the youths in the region that can enable them to engage in the productive activities hence reduce rates of unemployment in the country.	The stakeholder agreed that youth must be sensitise to make use of the opportunities whenever the university organises the trainings.

5.4. Stakeholders Engagement during Implementation

During Project implementation, engagement activities will be undertaken in relation to project activities. At this stage, the study will conduct a number of structured and formal meetings, focus group discussions, community meetings, one to one interview and site visits that will involve a number of stakeholders. The timing for the conducts of the above meetings will be determined by the progress of the project implementation and when seems necessary to invite stakeholders for their comments and observation. However, the sharing of information and progress with stakeholders will be subject to scrutiny with regards to the kind of information to be shared and how the same will be communicated to stakeholders. Furthermore, at this stage, the MUST will ensure equal and effective participation from project preparation to implementation stages. To

ensure stakeholders' views and concerns are well captured, the SEP will have different methods of collecting and sharing information based on their needs i.e. disadvantaged or vulnerable groups (Table 5.3).

Table 5.3: Summary of the Stakeholder Engagement during Implementation

SN	OBJECTIVE	MESSAGES	MEANS OF COMMUNICATION
PROJECT PREPARATION			
1.	To present the draft SEP (for comment) and final versions of the instruments.	• Presentation of the Project and its implementation schedule • Present potential environmental and social impacts report and its enhancement and mitigation plan. • Describe Grievance Redress Mechanism • Present a list of identified stakeholders and describe an approach of their engagement.	• Organized public meetings /Consultations based on Stakeholders needs and circumstances (FGD, one on one meetings etc.) • Disclosure on MUST Website • Emailing to respective stakeholders • Email copies of the instruments to Non-State Actors and other institutions. • Sharing of executive summaries in hard copy during meetings • For stakeholders who are illiterate, information will be presented verbally during meetings in local language. • Disclosure of Project documentation in appropriate and accessible manner • The instruments will be disclosed in Swahili language in project offices and hard copies will be accessible to stakeholders
2.	ESIA / ESMP Preparation and Disclosure	• To inform the preparation of the Environmental Statement/ ESMP etc. and present findings when drafted to all the identified stakeholders	• Face to Face Meetings • Community Meetings • Site Visits based on stakeholders needs and circumstances. • Disclosure on MUST Website • FGD • Disclosure of Project documentation in appropriate and accessible manner • The instruments will be disclosed in Swahili language at the University, Sumbawanga District council and in

SN	OBJECTIVE	MESSAGES	MEANS OF COMMUNICATION
			the offices of the identified stakeholders or public meetings
CONSTRUCTION PHASE			
1.	Meeting to Alert stakeholders to the start of construction	• Inform stakeholders on the commencement of construction activities • Provide project Information and education on the risks and impacts, GRM, workers code of conduct etc.	• Public Meetings • Face to Face Meetings • Groups Discussions based on stakeholders needs and circumstances. • FGD, one on one meetings etc.
2.	Alert stakeholders of any new activities and Provide updates on project progress (every month)	• Inform public about any emerging issues; provide information on risks and impacts. GRM, workers code of conduct etc.	• Public Announcements • Focus Group Discussions • Community Meetings • Meetings with village Councils of Kianda
3.	Contact with the Project Coordination Team	• Provide phone number/WhatsApp account and email for stakeholders to submit questions and give out comments	• Meetings with village Councils of Kianda
THROUGHOUT THE PROJECT			
1.	Information dissemination	• General information on MUST Rukwa Campus College project implementation	• Posting on bulletin boards; Information leaflets, banners • Outreach activities with Lyangalile ward communities where presentations, workshops and public meetings will be conducted. • Sharing on MUST social media and website

SN	OBJECTIVE	MESSAGES	MEANS OF COMMUNICATION
			• Information accessible at Sumbawanga District Council
2.	Contact with the Project Coordination Team	• Maintain website with contact box, email, social media accounts and phone number for people to submit questions, comments and concerns.	• MUST's Websites • MUST's phone number for HEET activities and concerns will be shared to project sites and all stakeholders • MUST's phone number for HEET activities and concerns will also be found at Sumbawanga District Council

NOTE: The face-to-face consultations with stakeholders will strictly follow national and international guidelines on health and hygiene procedures in order to avoid the spread of diseases including COVID-19 and other respiratory diseases.

5.5. Stakeholders Engagement during Implementation: Proposed Strategy for Information Engagement

Information disclosure strategies attempt to increase the availability of information on the proposed construction of the MUST-Rukwa campus and the entire HEET project. The public disclosure of the information will be very useful in motivating and improving the performance of the project. During implementation, when new activities are being developed engagement will be undertaken to inform the development of the specific sub-project and plans. Further engagement on the frameworks will also be undertaken. Depending on the issue at hand, MUST will be developing agenda so as to ensure that key strategic and risk items can be discussed with all relevant stakeholders in order to foster decision making and address risk factors and develop enhancement measures during project implementation (Table 5.4). Thus, depending on the need of each stakeholder, MUST will use the following methods;

(i) **Focus Group Meetings/ Discussions** – MUST will employ FGD when aiming to bring together stakeholders with the same interests or common characteristics into a meeting to discuss specific topics or project components in a focused manner. FGD will be 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. The intention of using this approach is cantered upon establishing of similarities and differences among people of the same or different groups.

(ii) **Formal meetings -** These meetings will be focused to identify and discuss specific stakeholder concerns and to disclose project information. Participation in these meetings will be influenced by the issues under consideration and will include adequate

representation of women as well as other marginalized and vulnerable people where possible.

(iii) **One-on-one interviews –** The interviews will aim to give chance to individuals to air concerns on project and will involve government officials depending on the issues to be addressed.

(iv) **Distribution of pamphlets –** This is a way of sharing information to a wide range of individuals.

(v) **Site visits –** These visits are focused on identifying and discussing stakeholder concerns and to disclose project information within communities.

Table 5.4: Summary of Stakeholders' Communication Strategy

SN	Stakeholders group	Specific needs	Language	Communication Means
1.	Government Entities and Implementing Institutions and Agencies (TANESCO, RUWASA, FIRE, OSHA)	i. Inclusion in the decision-making processes and ii. implementation role of the project	Kiswahili	• Correspondence by phone/email • meetings • Roundtable discussions
2.	Communities and local government authorities of Kianda village	i. Sensitization as to the project, its benefits and their role. ii. Information on the Project and approach to managing environmental and social issues.	Kiswahili	• Community meetings • Outreach activities • Flyers • Banners
3	Students, Students government and people with disabilities at MUST	i. Sensitization as to the project, its benefits and their role. ii. Information on the Project and approach to managing environmental and social issues. iii. Consideration of their decision-making processes	Kiswahili	• Meetings • Roundtable discussions • Community meetings • Group discussions • Outreach activities • Flyers • Banners
4	Vulnerable Groups (women, youth, elders and the disabled) at project site surrounding areas	i. Sensitization as to the project, its benefits and their role. ii. Incorporation of the views and concerns of stakeholders iii. Information on the Project and approach to	Kiswahili	• Disclosure of Project documentation in a culturally appropriate and accessible manner.

SN	Stakeholders group	Specific needs	Language	Communication Means
		managing environmental and social issues. iv. Efforts to ensure VGs feel that their issues will be heard and addressed.		• Community meetings. • Group Discussions • Outreach activities
5	Other interested parties (NSAs (NGOs, CSOs, RBO), private sector etc.)	i. Depend on stakeholder to be met.	Kiswahili	• Correspondence by phone/email • Meetings • Roundtable discussions
6	MUST staffs (Both Academic and Administrative Staff)	i. Sensitization as to the project, its benefits and their role. ii. Information on the Project and approach to managing environmental and social issues.	Kiswahili	• Correspondence by phone/email • Meetings • Roundtable discussions • Flyers • Banners
7	Students and student organization at MUST	iii. Sensitization as to the project, its benefits and their role. iv. Information on the Project and approach to managing environmental and social issues.	Kiswahili	• Correspondence by phone/email • Meetings • Roundtable discussions

5.6. Stakeholders' Engagement Plan (SEP)

The engagement plan will be reviewed and updated throughout the project implementation. During this process, the focus and scope of the SEP may change to reflect the varying stages of project implementation and to encompass any changes in project design and lessons learnt from previous phases of the Project. However, it is important to develop a guiding framework that may act as roadmap for stakeholders' engagement as shown in Table 5.5.

Table 5.5: Stakeholders' Engagement Plan

Target Stakeholders	Objective	Messages/ Agenda	Means of Communication	Schedule/frequency	Responsible person/ group
PROJECT PREPARATION AND PRE-CONSTRUCTION PHASE					
Representatives of implementing institutions and agencies(TANESCO, RUWASA, OSHA); Local NSAs; Community groups representatives from Kianda villages, MUST Students and Student organization , MUST staff, service providers and private sector surrounding project site	To present drafts and get stakeholders inputs on the following instruments: i. Environmental and Social Management Framework (ESMF); ii. Stakeholder Engagement Plan (SEP)	1. Presentation on the Project– objectives, rationale, components, benefits and beneficiaries, implementation arrangements. 2. Implementation schedule and period 3. Potential environmental and social impacts, measures for mitigation and management 4. Describe Grievance Redress Mechanism 5. Present stakeholders identified and 6. Describe approach to stakeholder engagement 7. Explain on the measures, actions, plans, and expected	Organized public Meetings/ Consultations Disclosure of Project documentation	At least once per each stage of the project implementation	MUST Monitoring and evaluation team, E&S coordinator

Target Stakeholders	Objective	Messages/ Agenda	Means of Communication	Schedule/frequency	Responsible person/ group
		timelines for compliance with ESS documents 8. The LMP identifies the main labour requirements and risks associated with the project.			
Representatives of implementing institutions and agencies(TANESCO, RUWASA, OSHA); Local NSAs; Community groups representatives from Kianda village,, Students and Student organisation, MUST staff, service providers and private sector surrounding project site	To disclose finalized ESMF, SEP, LMP and ESCP and ESIA	1. Email message to advise Stakeholders of disclosure and where to access the disclosed documents. 2. Disclosure of Project documentation in an accessible manner	Organized public Meetings/ Consultations Disclosure of Project documentation Email copies to key individuals and organizations.	At least once per each stage of the project or once when there is changes or revision	MUST Monitoring and evaluation team
CONSTRUCTION PHASE					
Representatives of implementing institutions and agencies(TANESCO, RUWASA,FIRE,	Meeting to inform stakeholders to the start of construction	1. Inform stakeholders that construction will commence. 2. Information and education on the	Public Meetings Focus Groups Discussions. Face to Face Meetings	At least once per each stage of the project or once when there is changes or revision	E&S coordinators, MUST Monitoring

Target Stakeholders	Objective	Messages/ Agenda	Means of Communication	Schedule/frequency	Responsible person/ group
OSHA); Local NSAs; Community groups representatives from Kianda village, Students and Student organisation, MUST staff, service providers and private sector surrounding project site		risks and impacts, GRM, workers code of conduct etc. 3. Inform the stakeholders of the construction plans, builders, route for transportation of materials, water sources			and evaluation team
Representatives of implementing institutions and agencies(TANESCO, RUWASA, OSHA); Local NSAs; Community groups representatives from Kianda village, Students and Student organisation, MUST staff, service providers and private sector surrounding project site	1. To inform stakeholders of any new activities, unexpected impacts etc. during construction. 2. To Provide updates on project progress	3. Inform on the new changes and progress	Public Meetings Focus Groups Discussions. Face to Face Meetings	At least once per each stage of the project or once when there is changes or revision	MUST Monitoring and evaluation team, E&S coordinator
Representatives of implementing institutions and agencies(TANESCO,	1. Inform stakeholders of any new activities,	Inform public about any emerging issues Information and	Public Meetings Focus Groups Discussions.	At least once per each stage of the project or once when there is changes or revision	MUST Monitoring and evaluation

Target Stakeholders	Objective	Messages/ Agenda	Means of Communication	Schedule/frequency	Responsible person/ group
RUWASA, OSHA); Local NSAs; Community groups representatives from Kianda village, Students and Student organisation, MUST staff, service providers and private sector surrounding project site	unexpected impacts etc. during construction. 2. Provide updates on project progress	education on the risks and impacts, GRM, workers code of conduct etc. Updates on project progress etc.	Face to Face Meetings		team, E&S Coordinators
Community groups representatives from Kianda village, Students and Student organization, MUST staff, service providers and private sector surrounding project site	Resolve grievances received	1. To address grievances related to construction activities 2. Refer persons affected by project related GBV/SEA to services 3. To promote accountability for violations of GBV by project staff.	Face-to-face meetings Confidential and safe face to face referral for GBV survivors Meetings and aggrieved persons	Every time a grievance is received	E&S coordinators, MUST Monitoring and evaluation team, MUST Gender Unit and Gender Desk at Sumbawanga DC and police station
Representatives of implementing institutions and agencies(TANESCO, RUWASA, FIRE, OSHA); Community groups	Contact with the Environmental and Social Project Experts	Sharing of phone number and WhatsApp number to submit questions and other comments.	Phone number WhatsApp number	At least once per each stage of the project or once when there is changes or revision	E&S coordinators

Target Stakeholders	Objective	Messages/ Agenda	Means of Communication	Schedule/frequency	Responsible person/ group
representatives from Kianda village, Students and Student organization, MUST staff, service providers and private sector surrounding project site					
THROUGHOUT THE PROJECT (ALL COMPONENTS)					
Representatives of implementing institutions and agencies (TANESCO, RUWASA, OSHA); Community groups representatives from Kianda village, Students and Student organisation, MUST staff, service providers and private sector surrounding project	Information dissemination	To share general information on project, activities	Posting on bulletin boards; Information leaflets Community meetings Outreach activities – Focus groups. One to one meeting Sharing on MUST social media and website	At least once per each stage of the project or once when there is changes or revision	E&S coordinators and PRO office
Representatives of implementing institutions and agencies (TANESCO,	Contact with the Environmental and Social Project Experts	Sharing of phone number and WhatsApp number to submit questions and other comments.	Phone number WhatsApp number	At least once per each stage of the project or once when there is changes or revision	E&S coordinators

Target Stakeholders	Objective	Messages/ Agenda	Means of Communication	Schedule/frequency	Responsible person/ group
RUWASA, OSHA); Local NSAs; Community groups representatives from Kianda village, Students and Student organisation, MUSTstaff, service providers and private sector surrounding project site					

5.7. Disclosure

When the ESIA statement for this project will be approved and the certificate provided, MUST will disclose the approved project components information (ESIA, ESMP) to the public. The document will be made available in the institutional library, District, ward to inform the stakeholders on the response their concerns and views. A non-technical ESMP will be presented in both Kiswahili and English to make understandable by the public.

CHAPTER SIX

6. ASSESSMENT OF IMPACTS AND IDENTIFICATION OF ALTERNATIVES

6.1. Introduction

This section outlines the process of impact identification and assessment of the impacts in each stage of the proposed project. The proposed mitigation measures are outlined in chapter seven of which MoEST through MUST is committed to undertake so as to prevent or reduce the identified adverse impacts. This study is conducted for envisaging a road map to ensure the investments to be financed under this project are designed and implemented in an environmentally sound and socially acceptable manner that meets both requirements of World Bank Environmental Standards (ESS) and the Government of Tanzania (GoT) legislations.

- Environmental risks and impacts assessment done included: (i) those defined by the WB Environmental Health and Safety Guidelines, EHSGs; (ii) those related to community safety; (iii) those related to climate change (iv) any material threat to the protection, conservation, maintenance and restoration of natural habitats and biodiversity; and (v) those related to ecosystem services and the use of living natural resources;
- Social risks and impacts assessment done included: (i) threats to human security through crime or violence; (ii) risks that project impacts fall disproportionately on individuals and groups who, because of their particular circumstances, may be disadvantaged or vulnerable; and (iii) negative economic and social impacts relating to the involuntary taking of land or restrictions on land use.

6.2. Impact Identification

Impact identification is a process designed to ensure that all potential significant impacts are identified and considered in project design and implementation. A number of 'tools' are available to assist in impact identification. The simplest, and most frequently used, are checklists of impacts, although matrices, network diagrams and map overlays are also commonly used. In this EIA study, a checklist and matrix methods were used. The checklists which have been developed from previous experiences, provide lists of potential impacts associated with specific activities. They provide a quick method of identifying the impacts and in such help also practitioners to avoid overlooking some of potential of the impacts associated with a particular activity. The matrix provides a rather systematic way of evaluating the identified impacts.

6.2.1. Impacts Associated With Preconstruction, Construction and Operational Phase

Impacts of the project were grouped into impacts on the physical environment, impacts on the social environment and economic impacts, as listed hereunder:

A: Impacts on the physical Environment

(i) Acceleration of soil erosion

(ii) Generation of liquid waste
(iii) Generation of solid waste
(iv) Generation of Hazardous waste
(v) Increased runoff/storm water
(vi) Air pollution
(vii) Contribution to Climate change
(viii) Noise pollution
(ix) Generation of vibrations
(x) Visual impact
(xi) Increase pressure on natural resources

B. Impacts on Social Environment

(i) Employment opportunities
(ii) Increase in income generation opportunities
(iii) Changes in lifestyle and quality of life
(iv) Increase of academic facilities in Rukwa
(v) Population increases
(vi) Increased pressure on social services
(vii) Increased risks of communicable diseases
(viii) Change in social values and ethics
(ix) Food insecurity
(x) Price inflation of goods and services
(xi) Occupation health, safety and security risks
(xii) Community health and safety risks
(xiii) Child labour
(xiv) Increased incidence of GBV/SEA/SH
(xv) Increased transmission of STDs, COVID etc
(xvi) Loss of employment

C. Economic Impacts

(i) Increased Revenues to local authorities
(ii) Increased commercial and social activities around project locations
(iii) Increased income to local suppliers and service providers
(iv) Increased land values
(v) Loss of revenue to the government and University

6.3. Impact Evaluation

Identification of impacts was followed by prediction or estimation of the magnitude, extent and duration of the impact in comparison with the situation without the project. The matrix method was used (Table 31). To be able to predict whether impacts are likely to occur as well as their scale, the initial reference or baseline data prior to the project was determined, and the future

changes forecasted with or without the proposed project. The impact evaluation was based on experts' knowledge as well as checklists.

The significance of impacts was tested using the following criteria:

(i) The magnitude and likelihood of the impact and its spatial and temporal extent;
(ii) The likely degree of recovery of the affected environment;
(iii) The value of the affected environment;
(iv) The level of public concern; and
(v) Extensiveness over space and time (magnitude);
(vi) Intensiveness in concentration or in proportion to assimilative capacity;
(vii) Exceedance of environmental standards or thresholds;
(viii) Level of compliance with environmental policies, land use plans, sustainability strategy;
(ix) Level of adversity and seriousness in affecting ecologically sensitive areas;
(x) Level of adversity and seriousness in affecting heritage resources, other land uses; communities and/or indigenous peoples, traditions and values.

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

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

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

6.4. Impact Rating Criteria

Seven criteria were used to determine the significance of the impacts in the Matrix, these include

- **Spatial Scale-**The spatial dimension encompasses the geographical spread of the impacts regardless of whether they are short term or long term. Table 6.1 describes the ratings used in the Simple Matrix as far as spatial scale is concerned.

Table 6.1: Spatial Rating

International (I)	Trans-boundary
National (N)	Within country
Regional (R)	Within Region
Local (L)	On and adjacent to site

- **Temporal Scale-**Temporal boundaries refer to the lifespan of impacts. Table 6.2 describes the ratings used in the Simple Matrix.

Table 6.2: Temporal Rating

Short-Term (ST)	during construction
Medium-Term (MT)	Life of project
Long –Term (LT)	Residual impacts beyond life of project

- **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 impacts 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 long term impacts which go beyond the lifetime of the project.

Table 6.3: Impact Correlation Matrix for the Proposed Construction of MUST Buildings

SN	Impact	Project activities, phase and Impact Significance																					Impact Rating				
		Construction/Mobilization/Demobilization phase									Operation Phase										Decommissioning phase						
		Design and Risk Hazard Assessment (RHA)	Land acquisition	Site clearance	Establishment and operation of campsite	Exploitation of quarries/natural resources	Transportation of materials	Trench excavations and casting of foundation	Construction, installations & finishing works	Landscape activities	Teaching /imparting knowledge	Health care provision	Operation of cafeteria and hostels	Liquid waste management	Solid waste management	Hazardous waste Management	Provision of utilities	Maintenance works	Operation of Associated facilities	Occupancy/Tenancy	Demolition of structures	Termination of employment	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
Environmental Impacts																											
1.	Risk to generate emergency/disaster events	-3	0	0	-1	0	-1	-1	-3	0	-3	-1	-3	-2	-2	-2	-2	-1	-1	-3	0	0	N	LT	R		
2.	Acceleration of soil erosion	0	0	-3	-1	-3	-1	-1	0	-1	0	0	0	-1	-1	-1	0	-1	0	0	-1	0	L	ST	R	✓	
3.	Generation of liquid waste	0	0	-1	-3	-1	0	-1	-3	0	-2	-2	-3	+3	0	+3	0	-1	-1	-3	0	0	L	MT	R	✓	
4.	Generation of solid waste	0	0	-3	-3	-2	-1	-1	-2	-1	-3	-2	-3	0	+3	+3	0	-1	-1	-3	-3	0	L	MT	R	✓	

SN	Impact	Project activities, phase and Impact Significance																				Impact Rating				
		Construction/Mobilization/Demobilization phase									Operation Phase										Decommissioning phase					
		Design and Risk Hazard Assessment (RHA)	Land acquisition	Site clearance	Establishment and operation of campsite	Exploitation of quarries/natural resources	Transportation of materials	Trench excavations and casting of foundation	Construction, installations & finishing works	Landscape activities	Teaching /imparting knowledge	Health care provision	Operation of cafeteria and hostels	Liquid waste management	Solid waste management	Hazardous waste Management	Provision of utilities	Maintenance works	Operation of Associated facilities	Occupancy/Tenancy	Demolition of structures	Termination of employment	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
		✓ **Environmental Impact**																								
5.	Generation of Hazardous waste	0	0	0	-3	-1	0	0	-2	0	-2	-3	0	0	0	+3	+3	-1	-1	-1	-2	0	R	LT	IR	✓	✓
6.	Increased runoff/storm water	0	0	-1	-1	-1	0	0	-2	-2	0	0	0	+1	0	0	0	0	-1	-2	-1	0	R	MT	R	✓	
7.	Air pollution	0	0	-1	-1	-2	-2	-1	-3	-1	-1	-1	-1	0	-1	0	0	-1	-1	-1	-1	0	I	LT	IR	✓	✓
8.	Contribution to Climate change	0	0	-2	-2	-2	-2	-1	-3	+2	-1	-1	-2	+2	+2	+2	-2	-1	-1	-2	-1	0	I	LT	IR	✓	✓
9.	Noise pollution	0	0	-2	-2	-2	-2	-1	-3	-1	-1	-1	-1	0	0	0	0	-1	-1	-2	-2	0	L	MT	R	✓	

SN	Impact	Project activities, phase and Impact Significance																				Impact Rating				
		Construction/Mobilization/Demobilization phase									Operation Phase										Decommissioning phase					
		Design and Risk Hazard Assessment (RHA)	Land acquisition	Site clearance	Establishment and operation of campsite	Exploitation of quarries/natural resources	Transportation of materials	Trench excavations and casting of foundation	Construction, installations & finishing works	Landscape activities	Teaching /imparting knowledge	Health care provision	Operation of cafeteria and hostels	Liquid waste management	Solid waste management	Hazardous waste Management	Provision of utilities	Maintenance works	Operation of Associated facilities	Occupancy/Tenancy	Demolition of structures	Termination of employment	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
10	Generation of vibrations	0	0	-2	-2	-2	-2	-1	-3	-1	-1	-1	-1	0	0	0	0	-1	-1	-2	-2	0	L	MT	R	✓	
11	Visual impact	+3	0	-1	-1	-1	-1	-1	-2	-2	0	0	0	0	0	0	0	0	0	0	-2	0	L	LT	IR	✓	✓
12	Increase pressure on natural resources	0	0	-2	-1	-2	-1	-1	-2	-1	0	0	-1	+3	+3	+3	-1	-1	-1	-2	-2	0				✓	
Social impacts																											
1.	Employment opportunities	0	0	+2	+2	+2	+2	+2	+2	+2	+3	+3	+2	+1	+1	+1	+1	+1	+1	+2	+1	-3	I	LT	IR	✓	✓

SN	Impact	Project activities, phase and Impact Significance																				Impact Rating				
		Construction/Mobilization/Demobilization phase									Operation Phase										Decommissioning phase					
		Design and Risk Hazard Assessment (RHA)	Land acquisition	Site clearance	Establishment and operation of campsite	Exploitation of quarries/natural resources	Transportation of materials	Trench excavations and casting of foundation	Construction, installations & finishing works	Landscape activities	Teaching /imparting knowledge	Health care provision	Operation of cafeteria and hostels	Liquid waste management	Solid waste management	Hazardous waste Management	Provision of utilities	Maintenance works	Operation of Associated facilities	Occupancy/Tenancy	Demolition of structures	Termination of employment	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
2.	Increase in income generation opportunities	0	0	+2	+1	+1	+1	+1	+2	+1	+3	+3	+2	+1	+1	+1	+1	+1	+1	+2	+1	-3	L	LT	IR	✓	✓
3.	Changes in lifestyle and quality of life	0	0	+2	+1	+1	+1	+1	+2	+1	+3	+3	+2	+1	+1	+1	+1	+1	+1	+2	+1	-3	L	LT	IR	✓	✓
4.	Increased skills and impart knowledge to local communities	0	0	+1	+1	+1	+1	+1	+3	+1	+2	+1	+2	+1	+1	+1	+1	+1	+1	+1	+1	-3	N	LT	IR	✓	✓

SN	Impact	Project activities, phase and Impact Significance																				Impact Rating				
		Construction/Mobilization/Demobilization phase									Operation Phase										Decommissioning phase					
		Design and Risk Hazard Assessment (RHA)	Land acquisition	Site clearance	Establishment and operation of campsite	Exploitation of quarries/natural resources	Transportation of materials	Trench excavations and casting of foundation	Construction, installations & finishing works	Landscape activities	Teaching /imparting knowledge	Health care provision	Operation of cafeteria and hostels	Liquid waste management	Solid waste management	Hazardous waste Management	Provision of utilities	Maintenance works	Operation of Associated facilities	Occupancy/Tenancy	Demolition of structures	Termination of employment	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
5.	Increase of academic facilities in Rukwa	0	0	0	0	0	0	0	0	0	+3	+2	+2	0	01	0	0	0	0	0	0	-3	N	LT	IR	✓	✓
6	Increased Revenues to local authorities	0	0	+2	+2	+2	+2	+2	+2	+2	+3	+3	+2	+1	+1	+1	+1	+1	+2	+2	+1	-3	N	LT	R	✓	✓
7	Population increases	0	0	-1	-1	-1	-1	-1	-2	-1	-3	-2	-2	0	0	0	0	-1	-1	-2	-1	0	R	LT	IR	✓	✓
8	Increased pressure on social services	0	0	-1	-1	-1	-1	-1	-2	-1	-3	-2	-2	0	0	0	0	-1	-1	-2	-1	0	R	LT	IR	✓	✓

SN	Impact	Project activities, phase and Impact Significance																				Impact Rating				
		Construction/Mobilization/Demobilization phase									Operation Phase									Decommissioning phase						
		Design and Risk Hazard Assessment (RHA)	Land acquisition	Site clearance	Establishment and operation of campsite	Exploitation of quarries/natural resources	Transportation of materials	Trench excavations and casting of foundation	Construction, installations & finishing works	Landscape activities	Teaching /imparting knowledge	Health care provision	Operation of cafeteria and hostels	Liquid waste management	Solid waste management	Hazardous waste Management	Provision of utilities	Maintenance works	Operation of Associated facilities	Occupancy/Tenancy	Demolition of structures	Termination of employment	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
9.	Increased risks of road accidents	0	0	-1	-1	-1	-1	-1	-1	-1	-3	-1	-1	0	0	0	0	-1	-1	-1	-1	0	R	LT	IR	✓	✓
10.	Increase in level of crimes	0	0	-1	-1	-1	-1	-1	-2	-1	-3	-1	-1	0	0	0	0	-1	-2	-2	-2	-2	L	LT	R	✓	
11	Increased risks of communicable diseases	0	0	-1	-1	-1	-1	-1	-2	-1	-3	+2	-1	+2	+2	+2	+2	-1	-2	-2	-2	-2	I	LT	R	✓	
12	Change in social values and ethics	0	0	-1	-1	-1	-1	-1	-2	-1	-3	-1	-2	-1	-1	-1	-1	-1	-2	-1	-1	-1	L	I	IR	✓	✓
13	Price inflation of goods and services	0	0	-1	-1	-1	-1	-1	-2	-1	-3	0	-2	0	0	0	0	0	-1	-2	-1	-1	R	MT	R		

SN	Impact	Project activities, phase and Impact Significance																			Impact Rating				
		Construction/Mobilization/Demobilization phase									Operation Phase										Decommissioning phase				
		Design and Risk Hazard Assessment (RHA)	Land acquisition	Site clearance	Establishment and operation of campsite	Exploitation of quarries/natural resources	Transportation of materials	Trench excavations and casting of foundation	Construction, installations & finishing works	Landscape activities	Teaching /imparting knowledge	Health care provision	Operation of cafeteria and hostels	Liquid waste management	Solid waste management	Hazardous waste Management	Provision of utilities	Maintenance works	Operation of Associated facilities	Occupancy/Tenancy	Demolition of structures	Termination of employment	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
14	Occupation health, safety and security risks	0	0	-1	-1	-1	-1	-1	-2	-1	-3	0	-2	0	0	0	0	0	-1	-2	-1	-1	L	MT	R		
15	Community health and safety risks	0	0	-1	-1	-1	-2	-1	-2	-1	-3	+2	-2	+2	+2	+2	0	0	-1	-2	-1	-1	L	MT	R		
16	Child labour	0	0	-1	-1	-1	-1	-1	-2	-1	0	-1	-2	-1	-1	-1	0	-1	-1	-1	-1	-1	L	MT	R		
17	Increased incidence of GBV/SEA/SH	0	0	-1	-1	-1	-1	-1	-2	-1	-3	+2	-2	0	0	0	0	-1	-1	-1	-1	-1	L	MT	R		

SN	Impact	Project activities, phase and Impact Significance																				Impact Rating				
		Construction/Mobilization/Demobilization phase									Operation Phase										Decommissioning phase					
		Design and Risk Hazard Assessment (RHA)	Land acquisition	Site clearance	Establishment and operation of campsite	Exploitation of quarries/natural resources	Transportation of materials	Trench excavations and casting of foundation	Construction, installations & finishing works	Landscape activities	Teaching /imparting knowledge	Health care provision	Operation of cafeteria and hostels	Liquid waste management	Solid waste management	Hazardous waste Management	Provision of utilities	Maintenance works	Operation of Associated facilities	Occupancy/Tenancy	Demolition of structures	Termination of employment	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
18	Increased transmission of STDs, COVID etc	0	0	-1	-1	-1	-1	-1	-2	-1	-3	+2	-2	0	0	0	0	-1	-1	-1	-1	-1	I	LT	R	✓	
19	Traffic snarl up and accidents	0	0	-1	-1	-1	-1	-1	-2	-1	-3	0	0	0	0	0	0	0	0	-1	-1	0	L	LT	R		
20	Loss of employment	0	0	+1	+1	+1	+1	+1	+3	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	-3	I	MT	IR		
21.	Increased commercial and social activities around project locations	0	0	+2	+2	+2	+2	+2	+2	+2	+3	+3	+2	+1	+1	+1	+1	+1	+2	+2	+1	-3	L	LT	R	✓	✓

SN	Impact	Project activities, phase and Impact Significance																					Impact Rating				
		Construction/Mobilization/Demobilization phase									Operation Phase										Decommissioning phase							
		Design and Risk Hazard Assessment (RHA)	Land acquisition	Site clearance	Establishment and operation of campsite	Exploitation of quarries/natural resources	Transportation of materials	Trench excavations and casting of foundation	Construction, installations & finishing works	Landscape activities	Teaching /imparting knowledge	Health care provision	Operation of cafeteria and hostels	Liquid waste management	Solid waste management	Hazardous waste Management	Provision of utilities	Maintenance works	Operation of Associated facilities	Occupancy/Tenancy	Demolition of structures	Termination of employment	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
22.	Increased Income to local suppliers and service providers	0	0	+2	+2	+2	+2	+2	+2	+2	+3	+3	+2	+1	+1	+1	+1	+1	+2	+2	+1	-3	I	LT	IR	✓	
23.	Increased land values	0	0	+1	+1	+1	+1	+1	+3	+1	+3	+2	+2	+1	+1	+1	+1	+1	+1	+1	+1	-2	L	LT	IR	✓	✓
24.	Loss of revenue to the government and University	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	-1	-3	N	ST	R		

6.5. Potential Environmental and Social Impacts during the Mobilisation and Construction Phase

6.5.1. Positive social impacts

6.5.1.1. Job Creation and Employment Opportunities

During this phase, about 20 people shall be employed by the contractor to do mobilization works such as construction of campsites, quarrying and material extraction and transportation activities etc. In additional to that, there will be an increase of self-employment (indirect 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, *mama Ntilie* will be obvious to meet the increased number of the people working at this phase. The increased income to the community will enhance their economic status, even though for short while. This impact is perceived to be of medium significance, felt at regional scale within Rukwa Region, and will have residual impacts on the community.

6.5.1.2. Increase in Income Generation Opportunities

This influx of people and particularly skilled and unskilled labourers in the area will provide an opportunity for local people to engage in some sort of business activities that will enable them to get more income compared to the previous time in which most of them depended on agriculture and farming as their only source of income. The project will create a new source of income for both the people within Kianda communities as well as the surrounding communities of Lyangalile ward and Sumbawanga district in general.

This impact will be moderate and will affect the project communities of Kianda as well as other local communities surrounding Lyangalile ward and Sumbawanga district and will be a long-term impact.

6.5.1.3. Changes in Lifestyle and Quality of Life

It is expected that, the increase in employment opportunities both formal and informal will result to the rise of high wages among the population in the areas as well as the surrounding communities. This is likelihood to increase their expenditure and consequently alter their living standard. This will also have a multiplier effect in the communities that the workers come from, as they will for example be able to pay for school fees as well as buy assets such as bicycles and radios. Apart from that, the influx of people in the area will result to an increased number of people with mixed culture hence easy to alter or influence the same to undergo some changes that may be positive or negative.

6.5.1.4. Increased Revenues to Local and National Authorities

The proposed project development can benefit local communities in terms of income generating employment. This will allow opportunities within the local business community, such as the provision of services and supply of goods such as food, hotel and building materials. The local business community as such would therefore also have more money circulating within it creating additional spin off effects for improvement of the local economy. It is also expected that the increased business and investments in the area will give an opportunity for local government authorities to collect tax and consequently improve the availability of social services in the area. Overall, as users pay specific taxes and fees for services, the local and national revenue will increase even before the commencement of the operational phase.

This impact will be moderate and will affect entire nation in the sense that revenue collected from the project area will not be used in the local area but rather will contribute to the nation budget and will likely to have a long-term impact in the sense that even at the end of the phase the source of incomes developed prior will persist and grow in terms of size and services. The impacts will be reversible in the sense that the government may propose and or develop strategies to retain the revenues or even multiplies as the project will be more growing in the stage to follow.

6.5.1.5. Increased Commercial and Social Activities around Project Locations

It is envisaged that the pre-construction stages of the buildings at Kianda village; Sumbawanga District which includes but not limited to; site clearance, establishment of campsites, and transportation of materials will attract a number of investors from within and outside surrounding communities to invest in meeting the needs of the increased population as well as people seeking for employment in the area. This is likely to enhance the development of the centres at surrounding areas. It is also expected that service providers such as food venders and general kiosks may be established and increase during construction phase to provide services to both skilled and unskilled labourers working in the project site.

This impact will be moderate and will affect the project communities of Kianda village as well as other local communities surrounding Lyangalile ward and Sumbawanga district and will be a long-term impact in the sense that even at the end of the phase the new commercial activities at the project site will persist and grow in terms of size and magnitude of the services to be provided. After the end of this phase the impacts will be reversible in the sense that the owners of these social and commercial activities may develop new strategies to re-construct and re- develop.

6.5.1.6. Increased Income to Local Suppliers and Service Providers

The Population of Kianda village is expected to triple in the next few years as a result of the MUST-Rukwa campus construction. During construction, the project is expecting to employ more than two hundred (200) people from outside Kianda village.

Therefore, the village will be having more people than before. The change in population level due to influx of workers and labourers will contribute to the new market opportunities for small, middle and big business persons. This will increase money circulation at the area leading to high income to the local suppliers and service providers.

This impact will be moderate and will affect the project communities of Kianda village as well as other local communities surrounding Lyangalile ward and Sumbawanga district and will be a long-term impact in the sense that even at the end of the phase the life of the local suppliers and service providers will remain improved. It is noted that, after the end of this phase the impacts will never be reversible (irreversible).

6.5.2. Negative social Impacts

6.5.2.1. Community Health and Safety Risks

During the site clearance, establishment of campsite, and trench excavation and casting of foundations will involve some activities that may rise in endangering the lives of the community members living close to those activities. This in turn will likely to endanger the lives of the local communities in form of accidents if appropriate measures are not taken.

6.5.2.2. Occupational Health and Safety Hazards

The most significant occupational health and safety issues occur during the operational (mainly related buildings are very prone to fire hazards because of different types of combustible materials and machines which, are used and installed, respectively. Electrical fault is by large the main culprit in fire accidents in buildings in Tanzania. The components of a fire are fuel (combustible substance), heat and oxygen. Unless all three are present fire will not occur. Fire can cause the following effects:

- Loss of lives;
- Serious Injuries; and
- Loss of properties

Therefore, the impact is then considered to be negative of long-term duration and high significance.

6.5.2.3. Increased traffic jam

The number of vehicles within the area is likely to increase and this may lead to congestion and road accidents along the road leading to the site.

Therefore, the impact is then considered to be negative of long-term duration and low significance.

6.5.2.4. Increased in level of crimes

It is expected that the operation phase will recruit more staffs and enrol the students from the communities around and other from within and outside the country. In addition, the project will attract people from various areas to come and invest the provisions of good and services. The increase in Population increase will stimulate the growth of the trading centres around the project site. Experience and sociological point of view show that where there is a big concentration of people from various backgrounds and behaviour, levels of crimes and changes in norms and behaviour are common. This is also is likely to be the case of the trading cen tres around the project site and other nearby areas.

Therefore, the impact is then considered to be negative of long-term duration and medium significance.

6.5.2.5. Prevalence of Communicable Diseases

Influx of students and employees from different part of the country will increase interaction, consequently increasing the risk of getting HIV/AIDS infections and other communicable diseases. That, the growth of trading centres in the area will attract different businesses and different people to the extent that the level of prostitution will also increase in the area provided that there will be employees from other areas of the country. Increased prevalence of communicable diseases like HIV/AIDS will likely to happen and consequently result to the increased number of orphans and single parenting in the project area as well as increased level of communicable diseases. This impact will be high and its effect will go internationally due to the fact that currently the world is like a village and that the Campus will attract both local and international students and will be a long-term impact.

Therefore, the impact is then considered to be negative of long-term duration and high significance.

6.5.2.6. Increased Incidence of GBV/SEA/SH

Projects like this can be a high-risk environment for GBV affecting community members, workers and service users. GBV risks can intensify within local communities when there are large influxes of male workers from outside the area. Such workers often come without their families and have large disposable incomes relative to the local community, and can pose a risk in terms of sexual harassment, violence and exploitative transactional relationships. These risks are higher where workers come into close contact with the local community, for example on access routes or when living together in remote areas. Addressing gender-based violence in construction projects improves workers' physical and emotional wellbeing and strengthens occupational health and safety also builds relationships and social license to operate in communities.

This negative impact is considered high and are likely to affect the local communities for a mid-term.

6.5.3. Negative Environmental Impacts

6.5.3.1. Loss of Landscape and Scenic View

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

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

However, the proposed project components can also change the overall character of an area to make it look more urban. *This impact will be localized at the site, long term during the life of the project and has both cumulative and residual impacts.*

6.5.4. Land Pollution

Construction activities will generate large quantities of waste materials, both liquid and solid (including hazardous waste), with varying nature, including scrap metal, plastic, wood, concrete, bricks etc (as described in Chapter two of this report). When these materials are not properly disposed of, it will contribute to the land pollution area. Land could also be polluted by oil spills, from machines an equipment, placement of construction materials on bare land and others.

This impact is assessed to be of local scale and short-term during construction. The significance of the impact is high and reversible.

6.5.5. Positive Environmental Impacts

6.5.5.1. Generation of soil that can be useful in some of activities

Mobilisation and construction phases involve excavation and clearance of the land for levelling and removal of the topmost soil.

The spoiled soil produced can used for gardening in nurseries where grasses, herbs and trees are grown for beatifying as well as conservation of the environment.

The spoiled soil can be used for repairing the paved roads and restoration of the degraded land.

The spoiled soil can also be used for making the unburned bricks which are commonly used for construction in Mbeya.

6.6. Potential Environmental and Social Impacts during Construction Phase

6.6.1. Positive Social Impacts

6.6.1.1. Jobs Creation/Employment Opportunities

Due to the scope of the proposed construction activities, this phase will be labour intensive. The selected Contractor is expected to employ professionals and non-professionals, to be sourced both locally and countrywide. There will also be other indirect employment opportunities/self-employment for transported of construction materials, suppliers of various goods and services etc. For example, an increase in restaurants, *mama Ntilie* will be obvious to meet the increased number of the people working at this phase. The increased income to the community will enhance their economic status. This impact is perceived to be of high significance, felt at regional scale within Rukwa Region, and will have residual impacts on the community.

6.6.1.2. Increase in Income Generation Opportunities

This influx of people and particularly skilled and unskilled labourers in the area will provide an opportunity for local people to engage in some sort of business activities that will enable them to get more income compared to the previous time in which most of them depended on agriculture and farming as their only source of income. The project will create a new source of income for both the people within Kianda community as well as the surrounding communities of Lyangalile ward and Sumbawanga district in general.

This impact will be moderate and will affect the project communities of Kianda as well as other local communities surrounding Lyangalile ward and Sumbawanga district and will be a long-term impact.

6.6.1.3. Changes in Lifestyle and Quality Of Life

It is expected that, the increase in employment opportunities both formal and informal will result to the rise of high wages among the population in the areas as well as the surrounding communities. This is likelihood to increase their expenditure and consequently alter their living standard. This will also have a multiplier effect in the communities that the workers come from and/or reside, as they will for example be able to pay for school fees as well as buy assets. Apart from that, the influx of people in the area will result to an increased number of people with mixed culture hence easy to alter or influence the same to undergo some changes that may be positive or negative.

This impact will be moderate and will affect the project communities of Kianda village as well as other local communities surrounding Lyangalile ward and Sumbawanga district and will be a long-term impact.

6.6.1.4. Increased Skills and Impart Knowledge to Local Communities

As noted in the previous paragraph, the construction phase of the proposed buildings will provide a number of opportunities for both skilled and non-skilled labourers. There will potentially be training opportunities or practical learning for local people and people from different part of the country that will secure employment or casual labour in the construction of the new MUST Rukwa campus. It is obvious that different people from the local area and others from different part of the country will be employed in the project particularly technicians and machine operators during this phase and consequently acquire necessary skills that will be of paramount important in their lives, communities and nation in general. This will enable them to improve their economic activities which will lead to higher income and hence improvement of their living standards or may use the skills in improving their lives and life of their fellow community members in the local areas of Kianda village, Lyangalile ward and the entire nation.

This positive impact arising from this will be high and are likely to affect the project communities of Kianda village as well as other local communities surrounding Lyangalile ward and the nation in general.

6.6.1.5. Increased Revenues to Local and National Authorities

The proposed project development can benefit local communities in terms of income generating employment that will be generated during the construction phase. This will allow opportunities within the local business community, such as the provision of services and supply of goods such as food, hotel and building materials. The local business community as such would therefore also have more money circulating within it creating additional spin off effects for improvement of the local economy. It is also expected that the increased business and investments in the area will give an opportunity for local government authorities to collect tax and consequently improve the availability of social services in the area. Overall, as users pay specific taxes and fees for services, the local and national revenue will increase even before the commencement of the operational phase.

This impact will be moderate and will affect entire nation in the sense that revenue collected from the project area will not be used in the local area but rather will contribute to the nation budget and will likely to have a long-term impact.

6.6.1.6. Increased Commercial and Social Activities around Project Locations

It is envisaged that the pre-construction stages of the buildings at Kianda village; Sumbawanga district which includes but not limited to; site clearance, establishment of campsites, and transportation of materials will attract a number of investors from within and outside surrounding communities to invest in meeting the needs of the increased population as well as people seeking for employment in the area. This is likely to enhance the development of the centres at surrounding areas. It is also expected that

service providers such as food venders and general kiosks (dukas) may be established and increase during construction phase to provide services to both skilled and unskilled labourers working in the project site.

This impact will be moderate and will affect the project communities of Kianda Village as well as other local communities surrounding Lyangalile ward and Sumbawanga district and will be a long-term impact.

6.6.1.7. Increased Income to Local Suppliers and Service Providers

The Population of Kianda village is expected to triple in the next few years as a result of the MUST-Rukwa campus construction. During construction, the project is expecting to employ people from outside Kianda village. Therefore, the village will be having more people than before. The change in population level due to influx of workers and labourers will contribute to the new market opportunities for small, middle and big business persons. This will increase money circulation at the area leading to high income to the local suppliers and service providers.
This impact will be moderate and will affect the project communities of Kianda as well as other local communities surrounding Lyangalile ward and Sumbawanga district and will be a long-term impact.

6.6.1.8. Increased Land Values

Upon commencement of the construction activities for MUST University at Rukwa will change the land status at Kianda area; Sumbawanga district, as well as the land at surrounding villages (entire Lyangalile ward). Land owners have the understanding that the introduction of the campus will cause their land to add value and therefore they have to plan for it and obtain title deeds. The title deeds will help them to obtain loans from financial institutions which will be used for different purposes like; improving their houses, paying for health services, education services etc. adding value to the land and the same will have a sustainable effect to the people in the local area.

This positive impact arising from this will be high and are likely to affect the project communities of Kianda village as well as other local communities surrounding Lyangalile ward for a long-term.

6.6.2. Potential Negative Social Impacts

6.6.2.1. Population Increases and Increased Pressure on Social Services

Residences in the project area and surrounding communities do not have sufficient social and infrastructural services provided to them such as in the areas of health, education and water. In view of this, the influx of people in the project area will increase pressure on the already limited social infrastructure and may without the taking of steps to alleviate this place a heavy additional burden on the existing service delivery system. During the construction phase it is expedient that workers will resides within these communities causing burden and pressure on the available limited social services.

These negative impacts arising from this will be moderate and are likely to affect the entire region surrounding the project area for a long-term.

6.6.2.2. Increased in Level of Crimes

It is expected that the selection and design stage will recruit a considerable number of workers both skilled and non-skilled from the communities around and other from the nearby communities. In addition, the project will attract people from various areas to come and invest the provisions of good and services. The increase in Population increase will stimulate the growth of the trading centres around the project site. Experience and sociological point of view show that where there is a big concentration of people from various backgrounds and behaviour, levels of crimes and changes in norms and behaviour are common. This is also is likely to be the case of the trading centres around the project sites like Kianda village and other nearby areas.

These impacts will be negative in nature at a moderate level and will cover the local areas surrounding the project like Kianda village and the entire area of Lyangalile ward.

6.6.2.3. Community Health and Safety Risks

During the construction phase, some activities that may rise in endangering the lives of the community members living close to those activities. This in turn will likely to endanger the lives of the local communities in form of accidents if appropriate measures are not taken. In the areas where raw materials will be taken like sand, stones and water accidents are likely to happen if appropriate measures are not taken on board. On the transportation of raw materials to the site, drivers may fail to observe safety measures along the road something that may result to accidents to other road users like pedestrian, motorcyclist, and boda boda drivers.

This impact will be moderate and will affect the project communities of Kianda village as well as other local communities surrounding Lyangalile ward and Sumbawanga district and will be a short-term impact.

Influx of job speculators from other parts of Tanzania and neighbouring regions will increase interaction, consequently increasing the risk of getting HIV/AIDS infections and other communicable diseases. That, the growth of trading centres in the area will attract different businesses and different people to the extent that the level of prostitution will also increase in the area provided that there will be employees from other areas of the country. Increased prevalence of communicable diseases like HIV/AIDS will likely to happen and consequently result to the increased number of orphans and single parenting in the project area.

6.7. Potential 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:

6.7.1. Negative Environmental Impacts

6.7.1.1. Air Pollution

As per the IFC guidelines on Air Emissions and Ambient Air Quality Guidelines, construction and pre construction phases will be associated with emissions from construction equipment and vehicles, fugitive emissions from the workshops (hydrocarbons), emissions from small combustion processes used to deliver electrical or mechanical power, regardless of the fuel type, with a total, rated heat input capacity of between three Megawatt thermal (MWatt) and 50 MWatt)

Further, there will also be an increase in levels of fugitive dust from the construction activities mainly due to vegetation clearance, foundation excavation, movements of heavy machinery and windblown dust from bare land and piled construction materials. This may cause localized temporary disturbance to workers at construction sites and areas where sand and aggregates will be sources. Air pollutants have a range of health and environmental impacts. Exposure to hydrocarbons has impacts varying from mild to chronic effects. Respirable particulates are a public health hazard and may otherwise create considerable nuisances to the public and fauna. Deposition of dust on the site vegetation will interfere with plants photosynthesis process.

The level of air pollution will be judged in comparison with ambient air quality standards (see Chapter 9). This impact is of medium significance, international concern, long term and irreversible. Further, the impact has both cumulative (since there are also other existing sources) and residual impacts.

6.7.1.2. Increased Greenhouse Gas Generation

According to the ESS1, the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the welfare of current and future generations. The construction of the proposed MUST - Rukwa Campus is associated with GHGN emissions from cars, equipment, plants etc. Various internal combustion engines will release GHGs notably carbon-dioxide (CO_2), methane (CH_4) and small quantities of noxious gases such as Nitrogen Oxides (NOx), Sulphur Oxides (SOx) and hydrocarbons. The generation and emission rate will depend on equipment type, road condition, speed of vehicles, quantities of equipment, duration, and prevailing atmospheric conditions, particularly wind and moisture of the air. The main source of emission of atmospheric pollutants will emanate from mobile sources-the exhaust engines (trucks/tipper, wheel loaders). Table 6.4 shows the emission factors of the various construction equipment and vehicles, and approximated emissions.

Table 6.4: Emission of Construction Equipment and Vehicles

S/N	Type	Quantity	Emission factors (Giunta *et al.*, 2019)		Total Emission	
			CO - g/hp-hr	NOx - g/hp-hr	CO g/day	NOx g /day
1	Excavator	1	0.75	4.31	0.34	1.90
2	Bulldozer	1	0.94	4.67	0.42	2.09
3	Trucks	5	11.24	15.27	25.12	34.13
4	Motor grader	1	0.75	4.31	0.34	1.90
5	Compactor	1	0.94	4.67	0.42	2.09
6	Crane	2	170	260	340	520

Analysis of baseline air quality indicated that the quality of air is good. Based on these findings, the level of the emissions of the precursory pollutants and the atmospheric pollutants from mobile sources will vary from day to day, according to the type of activity done during construction. However, even if the impact is very limited in time, it does not remain the same depending on the weather conditions. Of this fact the intensity of the impact of the construction of the project on air pollution was evaluated to be negative, cumulative, global, short term and moderate significance.

6.7.1.3. Contribution to Climate Changes

The IFC identifies the energy, transport and waste management sectors among other to be the major sources of GHGs. Transportation of construction materials and the labour force, use of fossil fuels for energy (combustion engines) and waste management activities have high potential for emission of greenhouse gases such SO_2, CH_4 and CO_2. The project will contribute to climate change in two ways. Firstly, it will be through generation of Greenhouse Gas emissions. Secondly, the project is expected to reduce CO_2 sequestration due to reduction of vegetated area of the campus.

The production of greenhouse gases has long-term consequences on a planetary level. This impact is considered of high significance, long term and of international concern. Further the impact is irreversible, has cumulative impacts (baseline indicated that waste burning is common practices, thus potential for GHG emissions) and has residual impacts.

6.7.1.4. Reduction of CO_2 Sequestration Potential

The ESS1 recognised CO_2 sequestration potential as one category of the Ecosystem Services (i.e. regulating services). Vegetation clearance during construction activities will reduce the CO_2 sequestration process. Land clearance will potentially reduce Carbon dioxide sequestration and hence reduction of global efforts towards climate change mitigation. It is estimated that, a forest can absorb 162 g C/m^2 to 168 g C/m^2 annually (Getter et al. 2009). Therefore, the potential reduction of about (166,066,200 – 172,216,800) g C/m^2 is expected.

6.7.1.5. Increased Noise Level during Construction

The baseline noise monitoring indicated that the average noise level at the site was 50.56 dBA, which is below IFC standards (55 dbA) for daytime exposure. Also, the Tanzania Standard limits guidelines require noise emission levels to be less than 55 dBA during the day within residential/institution areas. The proposed project activities will inevitably increase noise level. Noises from vehicles, equipment, construction crew, etc may rather be significant. Noise beyond some level (70dBA) is itself a nuisance and need to be avoided. This impact is local (at the proposed site) of moderate significance and short term during the construction phase. Residential area is at a distance of more than 100m from the proposed site. The impact is reversible, and is cumulative (adding to the existing noise level).

6.7.1.6. Increased Vibration

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

6.7.1.7. Generation of Waste and Hazardous during Construction

The construction industry produces a significant amount of wastes. Studies have indicated that construction waste can be as high as 10 to 15% of the materials utilized for the construction works. Thus, the amount of construction waste generated could be as high and the total amount of various materials use in the construction of the MUST Rukwa Campus. Examples of waste generated could include various building materials such as nails, electrical wiring, shingle, concrete, damaged bricks, insulations, dredging materials, rubble, etc. Some of the adverse impacts of the construction wastes include the following:

- Some of the construction wastes are difficult to dispose of and have no residual value (cannot be re used or recycled. This has impacts on waste management costs in terms of transportation, land required for disposal, and costs for establishing suitable disposal sites.
- Some of the construction wastes when exposed to moist environment, can release *hazardous components* such as lead, and other metal ions (i.e. Cu. Fe, Zn etc), than can contaminate land, and water resources. Such contamination can potentially enter the food chain and cause health effects to humans and other organisms.

Further impacts could also arise from improper disposal of food waste & packaging materials and human wastes generated onsite by the construction workers. Haphazard

disposal of food waste will attract scavenged birds, insects and rodents, which are diseases vectors. Human wastes carry infectious pathogens. Improper discharge or open defecation on the environment will contaminate soils, and pathogens can be carried by runoff to receiving water bodies, where they will contaminate water resources. Contamination of water resources and foods by pathogen can result in eruption of diseases such as cholera, typhoid, dysentery and diarrhoea. *The significance of this impact is high. The spread of the impact is local, and short-term during construction. The impact is revisable, but has cumulative impacts.*

6.7.2. Wastewater Management Problems

The types of wastewaters generated during construction activities include sewage, grey water and process water. Sewage effluent will be produced in the sanitary facilities provided and collected on site. Septic waste produced if not well disposed will also pose a problem to human health. This will be particularly severe if the waste is not collected directly and / or is released directly into the environment without any treatment. Grey sewage will pose less of a direct problem to human health but will be produced in large quantities in the camps. Further, process water generated from batching plants, equipment maintenance centres and ordinary sites will contain chemicals with deleterious effects. Wastewater if discharge in the natural environment can pollute environment and causing unhygienic sanitary conditions and nuisances to the human perceptions. *The significance of the impact is moderate as the impact is localised, short term and reversible*

6.8. Potential Impacts during the Operation Phase

6.8.1. Potential Positive Social Impacts

6.8.1.1. Diversification of MUST University

The proposed new campus will definitely make MUST a bigger university, with more learning facilities. More student's enrolment and an *increase diversity of courses* offered. This will bring both social and economic benefits to the nation. Also, the proposed project components shall provide adequate and conducive space for training, seminars, workshops etc. This impact is of high significance, and could be felt national level. The project will leave its mark, even after decommissioning, (those who gained knowledge will continue to benefit the nation).

6.8.1.2. Job Creation and Employment Opportunities

During this phase, people shall be employed by the University to conducts a number of activities at the campus including both academic and administrative activities. During this phase it is expected that more than students will be enrolled at the University calling for higher demand of both staff and non-staff. 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 at the campus as well as students studying at the

campus. For example, an increase in restaurants, bars, hotels, *mama Ntilie* will be obvious to meet the increased number of the people working in the site.
This positive impact arising from this will be high and are likely to affect large area as the project will pileup from the local area to international level (it is expected that some of the students and teachers may come out of the country) and will be a long-term impact.

6.8.1.3. Increase in Income Generation Opportunities

This influx of people and particularly students at the University calling for higher demand of both staff and non-staff providing an opportunity for local people to engage in some sort of business activities that will enable them to get more income compared to the previous time in which most of them depended on agriculture and farming as their only source of income. The project will create a new source of income for both the people within Kianda and communities as well as the surrounding communities of Lyangalile ward and Sumbawanga district in general.

This impact will be high and will affect the project communities of Kianda as well as other local communities surrounding Lyangalile ward and Sumbawanga district and will be a long-term impact.

6.8.1.4. Changes in Lifestyle and Quality Of Life

It is expected that, the increase in employment opportunities both formal and informal will result to the rise of high wages among the population in the areas as well as the surrounding communities. This is likelihood to increase their expenditure and consequently alter their living standard. This will also have a multiplier effect in the communities that the workers come from, as they will for example be able to pay for school fees as well as buy assets such as bicycles and radios. Apart from that, the influx of people in the area will result to an increased number of people with mixed culture hence easy to alter or influence the same to undergo some changes that may be positive or negative.

This impact will be high and will affect the project communities of Kianda village as well as other local communities surrounding Lyangalile ward and Sumbawanga district and will be a long-term impact.

6.8.1.5. Increased Skills and Impart Knowledge to Local Communities

As noted above, the operation phase of the University will register and train up to 3,000 students in different phase till its full capacity of the campus. In addition to that, there will potentially be training opportunities or practical learning for local people who will be employed in the project particularly staff and non-staff during this phase and consequently acquire necessary skills that will be of paramount important in their lives. During operation, the university will offer some short courses to help people to acquire necessary skills used to perform their daily activities. This will enable them to improve

their economic activities which will lead to higher income and hence improvement of their living standards.
This impact will be high and will affect the entire nation as well as education system and will be a long-term impact.

6.8.1.6. Increased Revenues to Local and National Authorities

The proposed project development can benefit local communities in terms of income generating employment. This will allow opportunities within the local business community, such as the provision of services and supply of goods such as food, hotel and building materials. The local business community as such would therefore also have more money circulating within it creating additional spin off effects for improvement of the local economy. It is also expected that the increased business and investments in the area will give an opportunity for local government authorities to collect tax and consequently improve the availability of social services in the area. Overall, as users pay specific taxes and fees for services, the local and national revenue will increase even before the commencement of the operational phase.

This impact will be high and will affect entire nation in the sense that revenue collected from the project area will not be used in the local area but rather will contribute to the nation budget and will likely to have a long-term impact.

6.8.1.7. Increased Commercial and Social Activities around Project Locations

It is envisaged that the pre-construction stages of the buildings at Kianda village; Sumbawanga district which includes but not limited to; site clearance, establishment of campsites, and transportation of materials will attract a number of investors from within and outside surrounding communities to invest in meeting the needs of the increased population as well as people seeking for employment in the area. This is likely to enhance the development of the centres at surrounding areas. It is also expected that service providers such as food venders and general kiosks (dukas) may be established and increase during construction phase to provide services to both skilled and unskilled labourers working in the project site.
This impact will be high and will affect the project communities of Kianda as well as other local communities surrounding Lyangalile ward and Sumbawanga district and will be a long-term.

6.8.1.8. Increased Income to Local Suppliers and Service Providers

The Population of Kianda village is expected to triple in the next few years as a result of the MUST-Rukwa campus construction. During construction, the project is expecting to employ more than 120 staffs and 3,000 students will be registered at the University from different part of the country. Therefore, the village will be having more people than before. The change in population level due to influx of workers and labourers will contribute to the new market opportunities for small, middle and big

business persons. This will increase money circulation at the area leading to high income to the local suppliers and service providers.

This impact will be moderate and will affect the project communities of Kianda village as well as other local communities surrounding Lyangalile ward and Sumbawanga district and will be a long-term impact.

6.8.1.9. Increased Land Values

Upon commencement of the operation activities for MUST University at Rukwa will change the land status at Kianda area; Sumbawanga district, as well as the land at surrounding villages in Lyangalile ward. Land owners have the understanding that the introduction of the campus will cause their land to add value and therefore they have to plan for it and obtain title deeds. The title deeds will help them to obtain loans from financial institutions which will be used for different purposes like; improving their houses, paying for health services, education services etc. adding value to the land and the same will have a sustainable effect to the people in the local area.

This positive impact arising from this will be high and are likely to affect the project communities of Kianda village as well as other local communities surrounding Lyangalile ward for a long-term.

6.8.2. Negative Social Impacts

6.8.2.1. Population Increase and Increased Pressure on Social Services

Residences in the project area and surrounding communities do not have sufficient social and infrastructural services provided to them such as in the areas of health, education and water. In view of this, the influx of people in the project area will increase pressure on the already limited social infrastructure and may without the taking of steps to alleviate this place a heavy additional burden on the existing service delivery system. During the operation phase it is expected that more than 4,000 students and employees of MUST will resides within these communities causing burden and pressure on the available limited social services.
These negative impacts arising from this will be high and are likely to affect the entire region surrounding the project area for a long-term.

6.8.2.2. Increased in Level of Crimes

It is expected that the operation phase will recruit more staffs and enrol the students from the communities around and other from within and outside the country. In addition, the project will attract people from various areas to come and invest the provisions of good and services. The increase in Population increase will stimulate the growth of the trading centres around the project site. Experience and sociological point of view show that where there is a big concentration of people from various backgrounds and behaviour, levels of crimes and changes in norms and behaviour are

common. This is also is likely to be the case of the trading centres around the project sites like Kianda village and other nearby areas.

These impacts will be negative in nature at a high level and will cover the local areas surrounding the project like Kianda and the entire area of Lyangalile ward

6.8.2.3. Prevalence of Communicable Diseases

Influx of students and employees from different part of the country (more than 120 staffs and 3,000 students from other parts of Tanzania and neighbouring regions) will increase interaction, consequently increasing the risk of getting HIV/AIDS infections and other communicable diseases. That, the growth of trading centres in the area will attract different businesses and different people to the extent that the level of prostitution will also increase in the area provided that there will be employees from other areas of the country. Increased prevalence of communicable diseases like HIV/AIDS will likely to happen and consequently result to the increased number of orphans and single parenting in the project area as well as increased level of communicable diseases.

This impact will be high and its effect will go internationally due to the fact that currently the world is like a village and that the Campus will attract both local and international students and will be a long-term impact.

6.8.2.4. Price Inflation of Goods and Services

Residences in the project area and surrounding communities do not have sufficient social and infrastructural services provided to them such as in the areas of health, education and water. In view of this, the influx of people in the project area will increase pressure on the already limited social infrastructure and may without the taking of steps to alleviate this place a heavy additional burden on the existing service delivery system. The high demand on goods and services by the increased number of people at the project site will lead to the price inflation of goods and services which will result to failure of some members of the community to buy or access the social services.

6.8.2.5. Increased Incidence of GBV/SEA/SH

MUST-Rukwa campus i one of the major University projects in Sumbawanga district. Normally, projects like this can be a high-risk environment for GBV affecting community members, workers and service users. GBV risks can intensify within local communities when there are large influxes of male workers from outside the area. Such workers often come without their families and have large disposable incomes relative to the local community, and can pose a risk in terms of sexual harassment, violence and exploitative transactional relationships. These risks are higher where workers come into close contact with the local community, for example on access routes or when living together in remote areas. Addressing gender-based violence in construction projects improves workers' physical and emotional wellbeing and strengthens occupational health and safety also builds relationships and social license to operate in communities.

These negative impacts arising from this will be high and are likely to affect the local communities for a mid-term.

6.8.2.6. Change in Social Values and Ethics

During operation phase of the project new people from different places of the country and outside the country will be employed and live at the project site. People with different values and ethics will have to live together with the local communities. In this case it is expected that the local community will have a lot to learn from the people. If the introduced values and ethics will not be good according to the local, national and international standards then the local community will be impacted negatively. Once the community is affected at the project site, the effects will soon be felt at the local and national levels.

During the operation phase it is expected that more than 3,000 students and 120 employees of MUST will resides within these communities causing change in social values and ethics. These negative impacts arising from this will be high and are likely to affect the local communities for a long-term.

6.8.3. Negative Environmental Impacts

6.8.3.1. Increased Runoff/Storm Water

Development of the propose site, including construction of structures and paved areas will significantly reduce surface area for storm water infiltration and uptake by plants. The vegetation cover of the site is about 96,275 square meters, of which 40% will be cleared to provide adequate space for physical facilities. The amount of storm water generated is estimated in chapter II. The increased surface runoff could potentially accelerate soil erosion and increase sediment transfer and pollution load to water body. *This impact is of moderate significance, local scale and of long term. The impact is reversible with proper mitigation; however, it is cumulative in nature.*

6.8.3.2. Health and Safety Risks Due to Fire Hazards

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

- Loss of lives;
- Serious Injuries;
- Loss of properties etc.

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

6.8.3.3. Contribution to Climate Changes during the Operation Phase

The operation of the Rukwa MUST Campus will contribute to Climate change in terms of emissions from energy (use electric appliances, utilisation of biomass/ electricity in cooking); transportation (emissions from diesel and petrol vehicles) and waste management (i.e. CH_4 emission from waste decomposition, CO_2 from waste burners) sectors. There will also be minor emission of hydrocarbons from printing devices. The IFS guidelines on GHGs emissions recognises these sector as major contributors to climate change. Emissions from these sectors, by the project have been quantified in chapter II. *The production of greenhouse gases has long-term consequences on a planetary level. This impact is considered of high significance, long term and of international concern. Further the impact is irreversible, has cumulative impacts (baseline indicated that waste burning is common practices, thus potential for GHG emissions) and has residual impacts.*

6.8.3.4. Impacts/Risks Associated with Generation of Solid Waste during Operation Phase

Operation of the Campus will result in generation of solid wastes, including paper wastes, plastics, rubbish yard wastes, floor sweepings etc. there will also be food wastes from operation in the kitchens and dining areas, food packaging materials and containers.

(i) Food waste is highly putrescible, and will decompose within few hours, producing foul smells that will attract scavenger organisms, flies and other disease vectors.
(ii) Haphazard disposal of solid waste will be a threat to public health. Scavenger animals can spread the waste to the nearby community areas, and result in eruption of diseases, especially those transmitted by flies and rodents.
(iii) Solid wastes, if they end up in water ways, will block water flow, and interfere the local hydrology.
(iv) The Sumbawanga DC has no sanitary landfill, thus collected waste material will be disposed in the designated waste dump. This has high potential for land contamination by the wastes and leachate (during the rain seasons).

Another impact is on air quality and Climate Change in case waste is burned. Burning of solid waste (which is a common practice in the project areas, due to lack of coordinated waste management services) will result in emission pf greenhouse gases, hence have impacts on local air quality and contribute to the global climate change. *The significance of this impact is high, the scale of impact is local, and medium term. The impact is irreversible, and has cumulative effects.*

6.8.3.5. Impacts/Risks of Liquid Waste Generation during Operation Phase

Significant amount of wastewater will be generated from toilets bathrooms, kitchen, and laundry areas. At peak, the university will have about 4000 people. High volumes

of wastes water will be generated and treated onsite before disposal (se chapter II). Improper management of wastewater has a number of impacts/risks as listed hereunder;

(i) Human wastes (faeces and urine) is rich in pathogens, bacteria and nutrients. If not properly disposed can contaminate food (via flies). When deposited in open land, it can contaminate soils and surface runoff, which will eventually contaminate surface water and ground water. Exposure to contaminated food or water can result into many health problems, including disease outbreaks (i.e. diarrhoea, typhoid and cholera).
(ii) Domestic wastewater is rich in nutrients, hence can cause eutrophication of receiving water bodies (River and water streams);
(iii) Oils and grease in sullage, if not separated, removed and treated can cause toxicity in aquatic environment;
(iv) Chemicals in soap detergents can cause toxicity in soil and aquatic organisms;
(v) Contamination of land and water resources could potentially contaminate the food chain

This impact will be felt locally, but in case of Lake Water contamination, the impact is rated at regional level and of medium term. *The significance of the impact is high. The impact is reversible and has cumulative impacts.*

6.8.3.6. Generation of Hazardous Waste during the Operation Phase

During the operation phase of the project, hazardous wastes will be generated from laboratory activities, involving the use of chemicals; oils, lubricants and containers, and contaminated rugs from the training workshop; cut materials (plastics, metals and similar) etc. Hazardous wastes will be generated from the health care facility (i.e. infection wastes, sharp objects, and chemicals). Table 6.5 provides a summary of impacts from various waste types and their associated risks/impacts is presented hereunder

Table 6.5: Waste Types and Associated Risks

HAZARDOUS WASTE TYPE	IMPACTS/RISKS
Medical Waste generated in the health care facilities	Health-care waste contains potentially harmful microorganisms that can ready infect any exposed person. Some wastes may include drug-resistant microorganisms which may spread from the campus into the environment. Risks and adverse health impacts associated with exposure may include: ▪ Infectious medical waste can cause disease in humans either through direct contact or indirectly by contamination of soil, ground or surface water and air. ▪ Accidents: sharps-inflicted injuries; ▪ Health impacts associated with toxic exposure to pharmaceutical products, in particular, antibiotics and cytotoxic drugs; Further, haphazard burning of medical waste may cause air pollution and health problem associated with inhalation of toxic substances such as mercury gas or dioxins.
Waste Batteries (Single batteries, reachable batteries and automotive batteries)	Most rechargeable batteries contain toxic metals such as ***cadmium, cobalt, lead, nickel, lithium etc***. Improper disposal of batteries may contribute to water and air pollution. When depleted batteries are thrown into the environment, they decay and leak the toxic metals. As batteries corrode, their chemicals soak into soil and contaminate soils, groundwater and surface water. ▪ Leached toxic materials released into the environment may poison food chain and pose serious threats to human health and the environment. ▪ If burned haphazardly, toxic fumes are produced. Long term exposures to the toxic fumes may result to chronic illness, including damage to the respiratory system. ▪ Most heavy metals in the batteries are known ***carcinogens*** i.e. exposure may lead to cancer development.
E-waste (Used/old/ damaged electronic devices including printer, photocopies. Lab equipment, workshop electronic equipment, gadgets etc	E-waste contains a list of chemicals that are harmful to people and the environment, like: mercury, lead, beryllium, brominated flame retardants, and cadmium. When electronics are mishandled during disposal, these chemicals may leach out and end up in soil oils, where it can washed away with runoff, and contaminate soils, water, and air. • The open-air burning releases toxic fumes, while acid baths leaches toxic materials leaching into the environment.

HAZARDOUS WASTE TYPE	IMPACTS/RISKS
	• The most dangerous property of heavy metals is their toxicity and tendency to accumulate in the environment. Highly toxic substances such as mercury, lead, beryllium, and cadmium can accumulate in bio water, in plants and animal tissues and pose a significant threat to the environment even in minute quantities Heavy metals. **Impacts on Climate Change:** Failing to recycle e-waste means more primary raw materials need to be extracted and refined, which might lead to an increase in greenhouse gas emissions.
Plastics	Plastics are non-biodegradable. When haphazardly dumped in the environment, it may take up to 1,000 years to decompose, leaching potentially toxic substances into the soil and water. Further, haphazard disposal of plastics on land and open air burning can lead to the release of toxic chemicals into the air causing public health hazards. ▪ Contamination of water resources: Chlorinated plastic can release harmful chemicals into soils & water resources, and eventually contaminate food chain (micro plastics have been found in soils, water and aquatic organisms) and cause toxic effects.

The scale of this impact is regional. The duration of the impact is long term during the operation phase of the campus. The significance of the impact is high, requiring mitigation measures, as provided in local and international guidelines i.e. the IFC. However, with application of the mitigation measures the impact revised. The impact will be cumulative, and will have residual impacts.

6.9. Potential Impacts during Decommissioning Phase

6.9.1. Negative Social Impacts

6.9.1.1. Loss of life and property due to Risks of Fire and Explosions

There are potential impacts to worker and community safety as well during the operation phase due to the risk associated with fire eruption due to electric shock. Fire and explosion hazards at retail sites may result from the presence of combustible gases and liquids, oxygen and ignition sources. Possible ignition sources include sparks associated with the build-up of static electricity, lightning, and open flames.
The impact is then considered to be negative of high significance.

6.9.1.2. Occupational Health and Safety Hazards

The most significant occupational health and safety issues occur during the operational (mainly related buildings are very prone to fire hazards because of different types of combustible materials and machines which, are used and installed, respectively.

Electrical fault is by large the main culprit in fire accidents in buildings in Tanzania. The components of a fire are fuel (combustible substance), heat and oxygen. Unless all three are present fire will not occur. Fire can cause the following effects:

- Loss of lives;
- Serious Injuries; and
- Loss of properties

Therefore, the impact is then considered to be negative of long-term duration and high significance.

6.9.1.3. Increased Traffic Jam

The number of vehicles within the area is likely to increase and this may lead to congestion and road accidents along the road leading to the site.

Therefore, the impact is then considered to be negative of long-term duration and low significance.

6.9.1.4. Increased in level of crimes

It is expected that the operation phase will recruit more staffs and enrol the students from the communities around and other from within and outside the country. In addition, the project will attract people from various areas to come and invest the provisions of good and services.

6.9.1.5. Loss of Employment and Business Opportunities

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

6.9.2. Positive Social Impacts

6.9.2.1. Minimized Occupational Health and Safety Hazards

The is likely to experience minimal cases of occupational Health and safety risks are minimised as the process may involve a few individuals in activities pertaining to decommissioning. The most significant occupational health and safety issues are not expected in this phase because of minimal use of machines and materials some of which could be combustible.

6.9.2.2. Reduced Traffic Jam

The number of vehicles within the area is likely to decrease due reduced operational activities at the institution which will result into reduced traffic jam.

6.9.2.3. Increased In Level of Crimes

It is expected that the decommissioning phase may involve a few individuals if the phase will involve changes in the use of buildings from being education institution to other uses. In addition, the decommissioning will not attract people from various areas that being the case, the area will have low population that might experience low levels of crimes.

6.9.3. Negative Environmental Impacts

6.9.3.1. Land Pollution and Loss of Aesthetic

In the event that decommission of the Campus involve demolition of structures, there is a risk that improper waste management could contaminate land (soils and water resources). In case demolition waste is left scattered, it will destroy the aesthetic values of the area, and its neighbouring environment. Abandoned waste management facilities (septic tanks, wetland could potentially become a breeding area for diesel causing vector, that could transmit infectious disease to the neighbouring community. *The significance of the impact is high. The spatial scale of the impact regional and its duration will be short term.*

6.9.3.2. Generation Demolition Waste Materials

The decommissioning of MUST Rukwa campus will generate demolition wastes that are heterogeneous mixtures of building materials such as aggregate, concrete, wood, paper, metal, insulation, and glass that are usually contaminated with paints, fasteners, adhesives, wall coverings, insulation, and dirt. Due to the complex composition of demolition waste, its haphazard disposal on the environment could have deleterious effects. For example, metals, paints when exposed to wet environment can potentially release toxic ions (through leaching), thus altering the soils chemistry, and contaminating water resources and the food chain. Other components such plastics and glass are non-decomposable, thus can remain in the environment for years. The waste if improper placed will become a safety hazard.

The significance of this impact is high. The scale of impact is local, and short term. The impact is reversible, and will have cumulative and residual impacts.

6.9.3.3. Air Pollution Resulting from Demolition Works

Demolition activities will potentially generate dusts and other air pollutants. Dust will emanate from gridding, drilling on concrete works, from moving, loading and off-loading of construction materials. Dust will have impacts on the aesthetic value of the area, impair plants photosynthesis and possibly impair visibility. Inhalation of fine particulates (PM) may cause health hazards to receptors (demolition workers). *The significance of this impact is low, of local scale and short term.*

6.9.3.4. Noise Pollution from Demolishing Works

Demolition activities are typically associated with noise levels above the standards. The main noise receptors will be the demolition force and neighbouring community. Noise is nowadays considered a public health concern. Impacts of noise could be physical (such as hearing loss) and psychological (such as frustration and nuisance). *The impacts of noise is considered local, of medium significance, short term but could be irreversible.*

6.9.3.5. Loss of Revenue to Institutions and the Government

As discussed above both town and Central government will be receiving revenue from the project. In case of the decommissioning of the project, the revenue generated will cease and hence the revenue base of local and central governments will shrink. This impact is high, local and will be long term.

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 MUST Rukwa Campus). Adopting the No Project alternative, this option would mean avoiding the predicted negative impacts of the project implementation, and missing the predicted positive impacts of the project. The HEET project at MUST 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 campus level.

6.10.2. Alternative Site

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

(i) The site is owned by Mbeya University of Science and technology (No need to buy a new piece of land);
(ii) The selected area is compatible with the land use;
(iii) The site is located on a favourable piece of land; large area with a clear view;
(iv) The site is well served with road network and it is easily accessible to public transport;
(v) Availability of water and electricity mains supply; and
(vi) The site has little interference from the settlements this provides a suitable environment for learning.

6.10.3. Alternative Energy Sources

The main source of energy for MUST Rukwa campus 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.

(i) ***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.

(ii) ***Alternative two - Diesel generators:*** These utilise 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 power outages.

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

(iv) ***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 least three options could be used together. Therefore, it is planned to connect the proposed infrastructure to electricity from the National grid as a basic power supply. 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.

6.10.4. Water supply Alternative

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

The Sumbawanga Rural Water Supply Authority (RUWASA) is the leading water supplier in the Sumbawanga District. This is the option considered to be appropriate as the water supply network is near the proposed site, and therefore can guarantee reliable, clean and safe water supply to the proposed MUST Rukwa Campus.

Alternative two: Groundwater Extraction

Statistics from Rukwa region 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.

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 Groundwater Extraction and rain water harvesting.*

Ground water extraction it is of most reliable quality. Therefore, water from drilled borehole will be used for domestic purposes and in the running of laboratory. Rainwater will be used for cleaning and gardens maintenance.

6.10.5. Liquid Waste Management Alternatives

Five alternatives were considered for liquid waste management, namely stabilization ponds/lagoons; use of up-flow anaerobic sludge blanket (UASB); constructed treatment wetland; septic tank - soakaway system; and direct discharge to the sewer system.

Alternative one: Use of Stabilization Ponds/Lagoons

This refers to the use of a series of ponds/lagoons, which allow biological processes to treat the wastewater to meet effluent quality standards. This method requires a large surface area on the ground, to facilitate natural treatment (degradation). This option has two major fall-backs:

(i) It requires large space and is incompatible with the MUST master plan

(ii) The open ponds will attract scavenger birds and animals to feed into the wastewater. The scavengers will create unaesthetically conditions at the site.

(iii) Generation of foul smells from the degradation of wastewater in the lagoons/ponds.

Alternative two: Anaerobic Baffled Reactor

The other alternative is the use of anaerobic baffled reactor will be used considered is connecting to One Up-flow Anaerobic Sludge Blanket (UASB). The system allow recovery of energy from the waste, in terms of sludge, biogas and nutrients rich water effluents. Further, the plant has many other advantages. It will be used for research and experiments; and it generates energy (biogas, manure, and nutrient rich effluent water) that could be used at the university, and save costs.

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.

Conclusion: Analysis of the five-alternative showed that alternatives four (Use of septic tank and soak pits systems) is the most favourable. The construction of the infrastructure will include construction of onsite septic soakaways systems. Descriptions are given in Section 2.3.2.2 Description for waste water treatment facility.

6.10.6. Solid Waste Management Alternatives

The proposed project will generate a considerable large amount of solid waste (estimated at 1.05 tones/day) from hostels, stationeries, workshops, laboratories, restaurants and offices. The University has considered two alternatives namely;

i) Collection and transportation to Sumbawanga dumpsite for disposal
ii) Collection, sorting, resource recovery and transportation of remaining waste to Sumbawanga dumpsite for final disposal

Alternative i: 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 to Sumbawanga dumpsite. Therefore, alternative one was abandoned.

Alternative ii: alternative two will involve integrated solid waste management; where by management will start with:

(i) Efforts to reduce waste generation:
(ii) Waste segregation and sorting into degradable and non-degradable; and recyclables and non-recyclables.

(iii) 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).
(iv) Degradable wastes will be utilised in existing research activities such as composting, biogas generation and maggot production. Staff collect a small amount of food waste as animal feed.
(v) The remaining non-decomposable and no recyclables will be stored on site in constructed chambers, before it is transported to Sumbawanga dump site for final disposal.

6.10.7. Alternatives Building Materials

It is estimated that building materials account for more than 60% of the total building cost, therefore, the selection of affordable building materials cannot be overemphasized.

The University looked into a variety of building materials for different aspects of the proposed infrastructures. Architects consulted with structural engineers on the load-bearing capabilities of available materials. Five common materials namely *concrete, steel, wood, masonry and stone* were considered as briefly described hereunder:

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

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

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

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

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

Conclusion: A team of Architects and Engineers evaluates these based on criteria such as *strength, weight and durability*, which would make it right for various uses;

compatibility with National standards and testing methods that govern the use of building materials in the construction industry; consideration for structural integrity and cost and aesthetics. The University shall opt to use a combination of materials except brick/masonry.

6.10.8. 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* and *clay roofing tiles*. The two materials were evaluated based on costs, availability, whether resistance, longevity, flexibility and corrosion resistance.

Conclusion: Although roofing tiles scored, more points in terms of whether resistance, longevity and resistance to corrosion, they were found to be more expensive that 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 SEVEN

7. IMPACTS MITIGATION AND ENHANCEMENT MEASURES

This chapter describes measures or interventions that shall be implemented to minimize the potential negative impacts and enhance the potential positive impacts identified in the preceding chapter. Many of the proposed mitigation measures are essentially good practice that shall be adhered to during all the project phases.

The design of the mitigation measures for the identified Environmental and Social impacts applied the mitigation hierarchy suggested in the ESF (i.e. ESS1) which are:

(i) Anticipate and avoid risks and impacts;
(ii) Where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels;
(iii) Once risks and impacts have been minimized or reduced, mitigate; and
(iv) Where significant residual impacts remain, compensate for or offset them, where technically and financially feasible.

7.1. Mitigation Measures during Preparatory Phase

Social Impacts

7.1.1. Community Health and Safety Risks

(i) Institute good site practices including prevent public access to the construction site by securing equipment and demarcate excavate, using warning signs with appropriate text (local language) and graphic displays;
(ii) Awareness campaigns /Education on HIV and STDs shall be provided to workers;
(iii) Appropriate working gear (such as nose, ear and mouth mask and clothing) and good construction site management shall be provided;
(iv) During construction, the contractor shall ensure that the construction site is fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, firefighting and clean and safe water supply;
(v) A well-stocked First Aid kit (administered by medical personnel) 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;
(vi) Reporting mechanisms for the public to register concerns or complaints regarding perceived risks to their health and safety due to the construction operation should be put in place;
(vii) Emergency contact details in the event of an accident shall be provided;
(viii) Develop and implement an emergency plan including spill response;
(ix) Training all contractor staff in emergency planning and spill response; and
(x) Developing a detailed health and safety plan and training all contractor staff on the plan.

Environmental mitigation measures

Risk of buildings/structural designs to have potential to generate emergency/disaster events

Technical studies

Geotechnical studies, Environmental and social impact assessment studies, master plans and feasibility studies shall be done by competent professionals to ascertain the project risks hazard profile of the site

Infrastructure and equipment design and safety

Structural elements of a project will be designed and constructed by competent professionals, and certified or approved by competent authorities or professionals. The Structural design will take into account climate change considerations, as appropriate.

Where the project includes new buildings and structures that will be accessed by members of the public, the MUST will consider the incremental risks of the public's potential exposure to operational accidents or natural hazards, including extreme weather events. Where technically and financially feasible, MUST will also apply the concept of universal access to the design and construction of such new buildings and structures

Safety of services

Where the project involves provision of services to communities, MUST will establish and implement appropriate quality management systems to anticipate and minimize risks and impacts that such services may have on community health and safety. In such circumstances, MUST will also apply the concept of universal access, where technically and financially feasible

Emergency Preparedness and Response

MUST will conduct a risk hazard assessment (RHA) to projects having potential to generate emergency events), as part of the environmental and social assessment undertaken pursuant to ESS1. Based on the results of the RHA, MUST will hire a Consultant to prepare an Emergency Response Plan (ERP) in coordination with the relevant local authorities and the affected community, and will consider the emergency prevention, preparedness and response arrangements put into place with project workers under ESS2. ERP will include, as appropriate: (a) engineering controls (such as containment, automatic alarms, and shutoff systems) proportionate to the nature and scale of the hazard; (b) identification of and secure access to emergency equipment available on-site and nearby; (c) notification procedures for designated emergency responders; (d) diverse media channels for notification of the affected community and other stakeholders; (e) a training program for emergency responders including drills at regular intervals; (f) public evacuation procedures; (g) designated coordinator for ERP implementation; and (h) measures for restoration and cleanup of the environment following any major accident

7.1.2. Increase in Pressure on Natural Resources

i. Exploitation of construction materials will take place from authorized and reliable sources only;
ii. Restoration of the borrow pits/quarries after use-constituting of levelling the area and seeding or planting of trees and/or grasses will be done in association with local government (department responsible for natural resources) and local environmental NGOs. If appropriate, the levelled area will be left for natural re-vegetation
iii. When the project is a potentially significant user of energy, the MUST will adopt measures specified in the EHSGs to optimize energy usage, to the extent technically and financially feasible
iv. When the project is a potentially significant user of water or will have potentially significant risks and impacts on water quality, in addition to applying the resource efficiency requirements, MUST shall use additional technically feasible water conservation measures, the use of alternative water supplies, water consumption offsets to maintain total demand for water resources within the available supply, and evaluation of alternative project locations.

7.2. Potential Mitigation Measures during Construction Phase

Negative Social Impacts

7.2.1. Community Health, Safety Risks and Security from the Handling, Transport, and Disposal of Construction Wastes

(i) Institute good site practices including prevent public access to the construction site by securing equipment and demarcate excavate, using warning signs with appropriate text (local language) and graphic displays;
(ii) Appropriate working gear (such as nose, ear and mouth mask and clothing) and good construction site management shall be provided;
(iii) During construction, the contractor shall ensure that the construction site is fenced and hygienically kept with adequate provision of facilities including waste disposal receptacles, sewage, fire-fighting and clean and safe water supply;
(iv) Reporting mechanisms for the public to register concerns or complaints regarding perceived risks to their health and safety due to the construction operation should be put in place;
(v) Emergency contact details in the event of an accident shall be provided;
(vi) Develop and implement an emergency plan including spill response;
(vii) Training all contractor staff in emergency planning and spill response;

7.2.2. Gender based violence

The Contractor 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.

7.2.3. Gender Discrimination

This project will ensure that there is involvement of women in project activities.

7.2.4. Child Labour

(i) MUST will conduct regular monitoring of project workers in relation to health, working conditions, hours of work, minimum age, and the other requirement of national law.
(ii) Work with local authorities and schools in the area to control school drop out
(iii) Cooperate with relevant authorities like Ministry of Labour to control child labour
(iv) Create awareness raising to the communities on the importance of education to the children
(v) The local authorities should develop bylaws to control the engagement of children in petty business or work in project related activities

7.2.5. Increased Level of Crimes

The following measures are very vital in minimizing the problem of crime;

(i) Establish community-based security in collaboration with village/ward leaders.
(ii) The contractor shall establish his own security to protect his properties and should establish community policing to support insufficient police force.
(iii) The community should be encouraged to participate in security matters by providing information on suspects
(iv) The cooperation of local people together will help to lessen criminal incidents and maintain security of people and their properties.

7.2.6. Increased Pressure on Social Services

(i) Explore alternative sources of domestic water, such as rainwater harvesting.
(ii) Link to mandated structures to support improvement of social and infrastructural services at the project site and communities surrounding project area.
(iii) Duty to the community requirement may be applied to justify the construction of new social services infrastructures or cooperate with local structures to strengthen the existing social services infrastructures
(iv) Use of water conservatively by instituting technologies (e.g. self-lock water taps) and awareness raising notices to users, etc.;
(v) Construction of underground water reserve tank and introducing rainwater harvest system;
(vi) Link to mandated structures to support improvement of social and infrastructural services at the campus and communities adjacent to the project area.

(vii) Duty to the community requirement may be applied to justify the construction of new social services infrastructures or cooperate with local structures to strengthen the existing social services infrastructures

7.2.7. Prevalence of Communicable Diseases

(i) Provide awareness to public on pathways of communicable diseases.
(ii) Provide Voluntary Counselling and Testing (VCT) centres for HIV/AIDS.
(iii) Provide more health facilities
(iv) Work close to government and private institutions that deal with the spread of communicable diseases
(v) 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;
(vi) 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;
(vii) Environmental sanitation systems shall be improved; and,
(viii) Adequate medical services shall be made available at the University dispensary for meeting the population demand.

Environmental Impacts

7.2.8. Occupational Health and Safety

Slips and Fall

(i) Implementing good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from foot paths
(ii) Cleaning up excessive waste debris and liquid spills regularly
(iii) Locating electrical cords and ropes in common areas and marked corridors
(iv) Use of slip retardant footwear
(v) The contractor will prepare a Health and safety Plan for mitigation of the accidents and prevention of electrocution hazards
(vi) The contractor shall prepare Traffic Management Plan

Work in Heights

(i) Training and use of temporary fall prevention devices, such as rails or other barriers able to support a heavy load, when working at heights equal or greater than two meters or at any height if the risk includes falling into operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface
(ii) Training and use of personal fall arrest systems, such as full body harnesses and energy absorbing lanyards able to support heavy loads (also described in this

section in Working at Heights above), as well as fall rescue procedures to deal with workers whose fall has been successfully arrested.

(iii) The tie in point of the fall arresting system should also be able to support heavy loads

(iv) Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones, as well as securing, marking, and labelling covers for openings in floors, roofs, or walking surfaces

Struck by Objects

(i) Using a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels

(ii) Conducting sawing, cutting, grinding, sanding, chipping or chiselling with proper guards and anchoring as applicable

(iii) Maintaining clear traffic ways to avoid driving of heavy equipment over loose scrap

(iv) Use of temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as hand rails and toe boards to prevent materials from being dislodged

(v) Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes

(vi) Institute good site practices including prevent public access to the construction site by securing equipment and demarcate excavate, using warning signs with appropriate text (local language) and graphic displays;

Moving Machinery

(i) Planning and segregating the location of vehicle traffic, machine operation, and walking areas, and controlling vehicle traffic through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic

(ii) Ensuring the visibility of personnel through their use of high visibility vests when working in or walking through heavy equipment operating areas, and training of workers to verify eye contact with equipment operators before approaching the operating vehicle

(iii) Ensuring moving equipment is outfitted with audible back-up alarms

(iv) Using inspected and well-maintained lifting devices that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.

Disease Prevention

(i) Awareness campaigns /Education on HIV and STDs shall be provided to workers;

(ii) A well-stocked First Aid kit (administered by medical personnel) 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;

(iii) Reporting mechanisms for the public to register concerns or complaints regarding perceived risks to their health Emergency contact details in the event of an accident shall be provided;

(iv) Training all contractor staff in emergency planning and management; and

(v) Developing a detailed health and safety plan and training all contractor staff on the plan.

Over-Exertion, and Ergonomic Injuries and Illnesses

(i) Training of workers in lifting and materials handling techniques in construction projects, including the placement of weight limits above which mechanical assists or two-person lifts are necessary

(ii) Planning work site layout to minimize the need for manual transfer of heavy loads

(iii) Selecting tools and designing work stations that reduce force requirements and holding times, and which promote improved postures, including, where applicable, user adjustable work stations

(iv) Implementing administrative controls into work processes, such as job rotations and rest or stretch breaks

7.2.9. Acceleration of Soil Erosion

(i) 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;

(ii) Maintain gravel fill and/or re-vegetate around the structures;

(iii) Unnecessary ground clearance and sensitive re-alignments shall be avoided;

(iv) Directing flow to properly designated channels;

(v) All excavation works shall be properly backfilled and compacted

(vi) Most of construction activities will be done during dry weather;

(vii) Mulching to stabilize exposed areas;

(viii) Designing channels and ditches for post-construction flows

(ix) Lining steep channel and slopes (e.g. use jute matting) and

(x) Reducing or preventing off-site sediment transport through use of settlement ponds, silt fences, and water treatment, and modifying or suspending activities during extreme rainfall and high winds to the extent practical.

7.2.10. Generation of Liquid Waste

(i) Contractor shall be instructed to put in place acceptable procedure for handling hazardous waste such as oils, lubricants and non-combustible waste;

(ii) Construction workers shall be provided portable/temporary toilets (portapoty) by contractor; and

(iii) Training on waste management shall be done for all personnel, operators and service providers.

7.2.11. Generation of Solid Waste

(i) The contractor shall have adequate facilities for handling the construction waste; and
(ii) Topsoil shall be stock piled and used for reclamation or re-vegetation at the site during landscaping.
(iii) Training on waste management shall be done to all personnel, operators and service providers.
(iv) All materials which can be reused shall be reused.
(v) Materials that cannot be reused shall be sent to an authorised dumpsite.
(vi) The contractor shall have adequate facilities for segregating, handling and storing the construction waste.
(vii) Topsoil shall be stockpiled and used for reclamation or re-vegetation at the site during landscaping.

7.2.12. Air Pollution

Impairment of Air Quality due to Emissions

(i) Equipment shall be maintained in good running condition and equipment, which generate excessive black smoke shall not be used;
(ii) Enforce vehicle road restrictions to avoid excessive emissions from engine overloading, where practical switching off engines will be done when machines are not in use;
(iii) There will be routine inspection of equipment;
(iv) Turn off engines to reduce idling.

Impairment of Air Quality Due to Dust

(i) Protect stockpiles of friable material subject to wind through wetting;
(ii) Cover loads with friable material during transportation;
(iii) Minimizing dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment (water suppression, bag house, or cyclone);
(iv) Minimizing dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content
(v) Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements
(vi) Avoiding open burning of solid
(vii) Restrict speed on loose surface roads to 30 km/hr during dry or dusty conditions; and,
(viii) Douse with water work sites with loose open soil to reduce dust generation when necessary.

7.2.13. Contribution to Climate Change

(i) Equipment shall be maintained in good running condition and equipment, which generate excessive black smoke shall not be used;
(ii) Enforce vehicle road restrictions to avoid excessive emissions from engine overloading, where practical switching off engines will be done when machines are not in use;
(iii) There will be routine inspection of equipment;
(iv) Turn off engines to reduce idling; and
(v) Green spaces shall be maximized in project areas

7.2.14. Noise Pollution

(i) Avoiding or minimizing project transportation through community areas
(ii) Vehicles carrying construction materials shall be restricted to work during day time only;
(iii) Machine operators in various sections with significant noise levels shall be provided with noise protective gear; and,
(iv) Construction equipment shall be selected, operated and maintained to minimize noise.
(v) MUST shall include in tenders, employment contracts, subcontractor agreements and work method statements clauses that assure the minimization of noise and compliance with directions from management to minimize noise;
(vi) The Contractor shall be required to give preference to the use quieter technology or other mitigation measures rather than lengthening construction;
(vii) Regularly train workers and contractors (such as at toolbox talks) to use equipment in ways that minimize noise;
(viii) Ensure that site managers periodically check the site, nearby residences and other sensitive receptors for noise problems so that solutions can be quickly applied;
(ix) Avoid shouting, and minimize talking loudly and slamming vehicle doors;
(x) Keep truck drivers informed of designated vehicle routes, parking locations, acceptable delivery hours and other relevant practices (e.g. minimizing the use of engine brakes and periods of engine idling).

7.2.15. Generation of Vibrations

(i) Impact pile driving shall be avoided where possible in vibration sensitive areas; and,
(ii) Vibratory rollers and packers shall be avoided.

7.2.16. Visual Impacts

(i) Locating parts of the development further away from the general public.

(ii) Avoid light pollution through choice of light fixtures when construction is done during the night

7.2.17. Generation of Hazardous Waste

(i) Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids,
(ii) Using impervious surfaces for refuelling areas and other fluid transfer areas
(iii) Training workers on the correct transfer and handling of fuels and chemicals and the response to spills
(iv) Providing portable spill containment and cleanup equipment on site and training in the equipment deployment
(v) Assessing the contents of hazardous materials and petroleum-based products in building systems (e.g. PCB containing electrical equipment, asbestos-containing building materials) and process equipment and removing them prior to initiation of decommissioning activities, and managing their treatment and disposal
(vi) Assessing the presence of hazardous substances in or on building materials (e.g., polychlorinated biphenyls, asbestos containing flooring or insulation) and decontaminating or properly managing contaminated building materials
(vii) All hazardous materials shall be handled by registered personnel/company

7.2.18. Land Pollution

(i) There should proper separation of materials and wastes, -selection (eg more environmentally friendly, etc.), less use, proper storage, etc.
(ii) An efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at project areas.
(iii) Ensure proper waste segregation and introduction of waste disposal bins, and warning notices, posted at strategic points;
(iv) No, on-site burial or open burning of solid waste shall be permitted.
(v) There should be proper procedure for handling hazardous waste such as oils, lubricants and non-combustible waste.

7.3. Potential Mitigation Measures during the Operation Phase

Negative Social Impacts

7.3.1. Increased Incidences of Diseases and Ill Health

(i) 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;

(ii) The project shall include information education and communication component (IEC) in its budget. This will help to raise more awareness on HIV/AIDS, and means to suppress its incidence;
(iii) Environmental sanitation systems shall be regularly improved; and,
(iv) Adequate medical services shall be made available at the University dispensary for meeting the population demand.

7.3.2. Increased Pressure on Social Services/Facilities and Utilities

(i) Limit the number of unskilled workers recruited from outside the direct vicinity as far as possible.
(ii) Explore alternative sources of domestic water, such as rainwater harvesting.
(iii) Link to mandated structures to support improvement of social and infrastructural services at the project site and communities surrounding project area.
(iv) Duty to the community requirement may be applied to justify the construction of new social services infrastructures or cooperate with local structures to strengthen the existing social services infrastructures
(v) Use of water conservatively by instituting technologies (e.g. self-lock water taps) and awareness raising notices to users, etc.;
(vi) Construction of underground water reserve tank and introducing rainwater harvest system;
(vii) Link to mandated structures to support improvement of social and infrastructural services at the campus and communities adjacent to the project area.
(viii) Duty to the community requirement may be applied to justify the construction of new social services infrastructures or cooperate with local structures to strengthen the existing social services infrastructures
(ix) Alternative measures like use of solar power, drilling a borehole at site, water recycling shall be explored and implemented if found feasible. For instance, use of energy savers bulbs shall be given high priority; and
(x) Use of air conditioning shall be kept to a minimum and maintenance of the cool indoor environment using natural ventilation system shall be strongly explored during the design process.

7.3.3. Gender Based Violence

The Contractor 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.

Increased Incidence of GBV/SEA/SH

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.

7.3.4. Child Labour

(i) MUST will conduct regular monitoring of project workers in relation to health, working conditions, hours of work, minimum age, and the other requirement of national law.
(ii) Work with local authorities and schools in the area to control school drop out
(iii) Cooperate with relevant authorities like Ministry of Labour to control child labour
(iv) Create awareness raising to the communities on the importance of education to the children
(v) The local authorities should develop bylaws to control the engagement of children in petty business or work in project related activities

7.3.5. Increased Level of Crimes

(i) Establish community-based security in collaboration with village/ward leaders.
(ii) The contractor shall establish his own security to protect his properties and should establish community policing to support insufficient police force.
(iii) The community should be encouraged to participate in security matters by providing information on suspects
(iv) The cooperation of local people together will help to lessen criminal incidents and maintain security of people and their properties.

7.3.6. Prevalence of Communicable Diseases

(i) Provide awareness to public on pathways of communicable diseases.
(ii) Provide Voluntary Counselling and Testing (VCT) centres for HIV/AIDS.
(iii) Work close to government and private institutions that deal with the spread of communicable diseases
(iv) 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;
(v) 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;
(vi) Environmental sanitation systems shall be improved; and,
(vii) Adequate medical services shall be made available at the campus and surrounding communities of Kianda for meeting the population demand.

Impacts on Physical Environment

7.3.7. Increased Runoff/Storm Water

(i) The design of storm water drainage will be given a high priority;
(ii) Where feasible, rainwater harvesting will be used in proposed project sites to minimise generation of surface runoff; and,
(iii)The design shall provide sufficient greenery area for facilitating soil infiltration.

7.3.8. Land Pollution

(i) Septic tank and soak away pits shall be designed in such a way waste treatment is achieved by 100% before disposal to the authorised disposal sites description are given in Section 2.3.2.2 Description for waste water treatment facility
(ii) No, on-site burial or open burning of solid waste shall be permitted.
(iii) Wastes not suitable for incineration and general municipal waste dumping (e.g. plastics, rubbers, tires, etc.) shall be removed for recycling, treatment, and/or disposal by a licensed contractor as appropriate.
(iv) There should be proper procedure for handling hazardous waste such as oils, lubricants and non-combustible waste.
(v) Wastes not suitable for incineration and general municipal waste dumping (e.g. plastics, rubbers, tires, etc.) shall be removed for recycling, treatment, and/or disposal by a licensed contractor as appropriate.

7.3.9. Health and Safety Risks due to Fire Hazards

(i) Adequate number of portable fire extinguishers shall be placed at strategic locations;
(ii) Good housekeeping shall be maintained at all sites to reduce the fire risk;
(iii) The design of buildings shall strictly adhere to the Fire Safety Standards;
(iv) Regular fire and other disaster drills and awareness training shall be conducted;
(v) Fire detectors and sprinkler system shall be installed in the buildings; and
(vi) The proponent shall insure buildings against fire Hazards.
(vii) Install water tanks

7.3.10. Contribution to Climate Change

MUST shall reduce direct and indirect greenhouse gas generation in the following ways;

(i) To change the consumption behaviour in terms of energy and water
(ii) Use of renewable energy technologies to minimize the carbon dioxide emission.
(iii) Promote use of natural green space at the campus to increase energy saving
(iv) The university shall transform to digital software operated work, in order to minimize paper consumption rates. This will greatly influence the educational standards. And will save a great deal to reduce the amount of forest resources consumed.

7.3.11. Increased Solid Waste Generation

(i) MUST management shall provide waste bins area for waste segregation in the project area.
(ii) Hazardous waste will be separated from non-hazardous waste for appropriate disposal by selling to the authorized dealers
(iii) A private cleanliness firm with adequate number of staff shall be commissioned to ensure cleanliness.
(iv) The skip buckets shall be emptied in authorized landfill twice a week.
(v) All hazardous waste shall be handled by registered authorized dealers recognized by NEMC

7.3.12. Increased Liquid Waste Generation

(i) The campus shall have liquid waste to collect the wastewater (sewage) to treatment facilities found at the campus
(ii) The collected sewage shall be disposed in anaerobic baffled reactor that is connected to constructed wetland systems before release to the environment.

7.3.13. Visual Impacts

i. Locating noise development further away from the general public.
ii. Light pollution can be reduced by keeping lighting (e.g. of parking lots) to the minimum levels needed for safety, and through the careful choice of light fixtures such as the use of flat-glass lanterns in car parks

7.4. Mitigation Measures During Decommissioning Phase

Social impacts

7.4.1. Loss of Employment

Seminars shall be conducted on alternative means of livelihood after termination of job

Environmental Impacts

7.4.2. Loss of Aesthetics due to Haphazard Disposal of Demolished Waste

(i) The debris resulting from the demolition will either be transported by a licensed waste transporter for dumping at an approved site or used as base material for new construction work;
(ii) All the necessary health and safety measures will be implemented including provision of personal protective equipment such as, safety harnesses, helmets, gloves, respirators, safety shoes, coveralls, goggles and ear protectors; and
(iii) Restoration of the affected land will involve the filling in of any open pits and grading the land to its natural contours, then planting appropriate tree species and under cover vegetation to hold the soil in place and to prevent flooding.

7.4.3. Noise and Vibration

(i) Planning activities in consultation with local communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance ·
(ii) Using noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines.
(iii) Avoiding or minimizing project transportation through community areas

7.4.4. Occupational Health and Safety

(i) Training of workers in lifting and materials handling techniques in decommissioning projects, including the placement of weight limits above which mechanical assists or two-person lifts are necessary
(ii) Planning work site layout to minimize the need for manual transfer of heavy loads
(iii) Selecting tools and designing work stations that reduce force requirements and holding times, and which promote improved postures, including, where applicable, user adjustable work stations
(iv) Implementing administrative controls into work processes, such as job rotations and rest or stretch breaks
(v) Implementing good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from foot paths
(vi) Cleaning up excessive waste debris and liquid spills regularly
(vii) Locating electrical cords and ropes in common areas and marked corridors
(viii) Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes
(ix) Using a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels

7.5. Enhancement Measures for Positive Project Impacts

Enhancement measures for project positive impacts during preparatory and construction phases

(i) Skills trainings and recruitment of employees should be given priority to the local communities
(ii) Employment should be gender sensitive
(iii) Reasonable wages should be paid to both skilled and unskilled labourers to be employed by the project
(iv) Qualified local vendors/ entrepreneurs should be given priorities to supply different goods and services to the project site

7.5.1. Increase in both Formal and Informal Employment

(i) Skills trainings and recruitment of employees should be given priority to the local communities
(ii) Employment should be gender sensitive
(iii) Employment opportunities to be offered based on merits and known interviewing procedures and grading systems.
(iv) Reasonable wages should be paid to both skilled and unskilled labourers to be employed by the project

7.5.2. Improved Quality of Life and Standard Of Living

(i) Creating awareness to the workers on employment schemes
(ii) Provision of training opportunities and entrepreneurial skills
(iii) Provide awareness to the local communities to use the opportunities available to improve their lives
(iv) Paying workers reasonable wages
(v) Supporting the local communities to provide quality social services to the people in the area.
(vi) Pay reasonable price to the sugar cane produced by out growers and other community members in the area

7.5.3. Increased Revenues to Local Authorities

(i) Local authorities should identify the new sources of revenue in the area
(ii) Strengthening revenue collection mechanisms
(iii) Awareness creation for the people in the area on the importance of paying revenues
(iv) Accountability in revenue collection among local authority employees
(v) Enhanced cooperation between the project and local authorities

7.5.4. Increased Skills to Local Communities

(i) Conduct training needs assessments
(ii) Initiate capacity building session base on the training needs assessments
(iii) Initiate short courses to help community members improve their activities
(iv) Cooperate with other social institutions in the area to identify challenges associated with skills development

Enhancement measures for project positive impacts during operation phase

7.5.5. Increase of Student's Enrolment to MUST

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

7.5.6. Increase of Revenue to MUST

i. MUST shall innovate business activities linked with academic activities for enhancing income of the University

7.5.7. Job creation

i. Employment shall be on equal opportunities for all genders.

7.5.8. Increased commercial and social activities at MUST

i. Provide good security within the project area and area of influence.
ii. Create conducive business opportunities for attracting investments

7.5.9. Growth of Trade and Increased Investment around MUST

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

7.5.10. Production of Skilled Labour Force for Nation Development

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

7.5.11. Increased Revenues to Local Authorities

(i) Local authorities should identify the new sources of revenue in the area
(ii) Strengthening revenue collection mechanisms
(iii) Awareness creation for the people in the area on the importance of paying revenues
(iv) Accountability in revenue collection among local authority employees
(v) Enhanced cooperation between the project and local authorities

CHAPTER EIGHT

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This chapter is focused at describing the mitigation measures or actions that shall be implemented so as to minimize any of the potential negative impacts identified and enhance the positive impacts the proposed project will have. The Environmental and Social Management Plan (ESMP) provides the way forward in the implementation of the identified mitigation measures to both environmental and social impacts. It also shows the estimated costs for implementing the mitigation measures. The proponent (MUST) is committed in implementing the suggested mitigation measures for each identified significant impact as shown in Table 8.1.

Table 8.1: Environmental and Social Impact Management Plan

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
PREPARATORY PHASE					
Increased pressure on social services	i. Limit the number of unskilled workers recruited from outside the direct vicinity as far as possible. ii. Provide First Aid Facilities on site. iii. Explore alternative sources of domestic water, such as rainwater harvesting. iv. Link to mandated structures to support improvement of social and infrastructural services at the project site and communities surrounding project area.	MUST /Sumbawanga District Council/Leaders	Preparatory phase	Daily	10,000,000
Risk of buildings/structural designs to have potential to generate emergency/disaster events	i. Geotechnical studies, Environmental and social impact assessment studies, master plans and feasibility studies shall be done by competent professionals to ascertain the project risks hazard profile of the site ii. Structural elements of a project will be designed and constructed by competent professionals, and certified or approved by competent authorities or professionals. The Structural design will consider climate change considerations, as appropriate. iii. Where the project includes new buildings and structures that will be accessed by members of the public, the MUST will consider the incremental risks of the public's potential exposure to operational accidents or natural hazards, including extreme weather events. Where technically and financially feasible, MUST will also apply the concept of universal access to the design and construction of such new buildings and structures	MUST /Sumbawanga District Council/Leaders	Preparatory phase	Daily	50,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	iv. Where the project involves provision of services to communities, MUST will establish and implement appropriate quality management systems to anticipate and minimize risks and impacts that such services may have on community health and safety. In such circumstances, MUST will also apply the concept of universal access, where technically and financially feasible v. MUST will conduct a risk hazard assessment (RHA) to projects having potential to generate emergency events), as part of the environmental and social assessment undertaken pursuant to ESS1. Based on the results of the RHA, MUST will hire a consultant to prepare an Emergency Response Plan (ERP) in coordination with the relevant local authorities and the affected community, and will consider the emergency prevention, preparedness and response arrangements put into place with project workers under ESS2. ERP will include, as appropriate: (a) engineering controls (such as containment, automatic alarms, and shutoff systems) proportionate to the nature and scale of the hazard; (b) identification of and secure access to emergency equipment available on-site and nearby; (c) notification procedures for designated emergency responders; (d) diverse media channels for notification of the affected community and other stakeholders; (e) a training program for emergency responders including drills at regular intervals; (f) public evacuation procedures; (g) designated coordinator for ERP implementation; and (h)				

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	measures for restoration and clean-up of the environment following any major accident				
Increase in pressure on natural resources	i. Exploitation of construction materials will take place from authorized and reliable sources only; ii. Restoration of the borrow pits/quarries after use-constituting of levelling the area and seeding or planting of trees and/or grasses will be done in association with local government (department responsible for natural resources) and local environmental NGOs. If appropriate, the levelled area will be left for natural re-vegetation iii. When the project is a potentially significant user of energy, the MUST will adopt measures specified in the EHSGs to optimize energy usage, to the extent technically and financially feasible iv. When the project is a potentially significant user of water or will have potentially significant risks and impacts on water quality, in addition to applying the resource efficiency requirements, MUST shall use additional technically feasible water conservation measures, the use of alternative water supplies, water consumption offsets to maintain total demand for water resources within the available supply, and evaluation of alternative project locations.	MUST /Sumbawanga DC/Leaders	Preparatory phase	Daily	10,000,000
Sub-total during preparatory phase					**271,500,000**
CONSTRUCTION PHASE					
Community health, safety risks and security from the handling,	i. GBV, SEA and sexual harassment training before working on the Project which will be provided by the Community Social Officers from the LGA and on the Child and Gender desk of the police. This will	Contractor/ MUST	Construction phase	Daily	5,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
transport, and disposal of construction wastes	include information on the GBV reporting mechanisms. ii. Institute good site practices including preventing public access to the construction site by securing equipment and demarcating project boundaries using warning signs with appropriate text (local language) and graphic displays. iii. The contractor shall prepare a Traffic Management Plan that incorporates training and testing of heavy vehicles operators and drivers, enforcement of speed limits, maximum loading restrictions and compliance with all Tanzania transportation law and standards. iv. Awareness campaigns/education on HIV and STDs shall be provided to workers and the community. v. Low-skilled workers will be hired around the project jurisdiction, if necessary, to reduce the population of foreigners. vi. Protect stockpiles of friable material subject to wind through wetting. vii. Cover loads with friable material during transportation. iii. Contractors will be provided with signage on issues such as HIV/AIDS, GBV etc which will be posted at worksites. ix. Contractors/workers will attend education sessions on disease transmission notably HIV/AIDS, and malaria and will implement the control measures needed to protect public health. x. Contractors/workers will ensure good housekeeping arrangements on-site to avoid creating breeding				

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	grounds for rodents and insects which can spread diseases. xi. Contractors will ensure access to potable water for all workers. xii. Contractors will be required to abide by national law about vehicle conditions and movements and behaviour of drivers. iii. Signage will be erected at construction sites to advise the community of the dangers of entering the site and appropriate barricades (fencing, tape etc) will be put in place, especially around quarries, trenches, etc.				
Gender based violence	The Contractor 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.	Contractor/ MUST	Construction phase	Daily	5,000,000
Gender discrimination	This project will ensure that there is involvement of women in project activities.	Contractor/ MUST	Construction phase	Daily	2,000,000
Child labour	i. MUST will conduct regular monitoring of project workers in relation to health, working conditions, hours of work, minimum age, and the other requirement of national law ii. Work with local authorities and schools in the area to control school drop out iii. Cooperate with relevant authorities like Ministry of Labour to control child labour iv. Create awareness raising to the communities on the importance of education to the children	Contractor/ MUST	Construction phase	Daily	2,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	v. The local authorities should develop bylaws to control the engagement of children in petty business or work in project related activities				
Increased level of crimes	i. Sumbawanga District to strengthen security services by provision of more police stations/posts. ii. Establish community-based security in collaboration with village/ward leaders. iii. The contractor shall establish his own security to protect his properties and should establish community policing to support insufficient police force. iv. The community should be encouraged to participate in security matters by providing information on suspects v. The cooperation of local people together will help to lessen criminal incidents and maintain security of people and their properties.	Contractor/ MUST	Construction phase	Daily	2,000,000
Increased pressure on social services	i. Limit the number of unskilled workers recruited from outside project area ii. Provide First Aid Facilities on site. iii. Explore alternative sources of domestic water, such as rainwater harvesting. iv. Link to mandated structures to support improvement of social and infrastructural services in villages at the project area. v. Duty to the community requirement may be applied to justify the construction of new social services infrastructures or cooperate with local structures to strengthen the existing social services infrastructures	Contractor/ MUST	Construction phase	Monthly	10,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
Occupational Health and Safety	i. Implementing good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from foot paths ii. Cleaning up excessive waste debris and liquid spills regularly iii. Locating electrical cords and ropes in common areas and marked corridors iv. Use of slip retardant footwear v. Training and use of temporary fall prevention devices, such as rails or other barriers able to support a heavy load, when working at heights equal or greater than two meters or at any height if the risk includes falling into operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface vi. Training and use of personal fall arrest systems, such as full body harnesses and energy absorbing lanyards able to support heavy loads (also described in this section in Working at Heights above), as well as fall rescue procedures to deal with workers whose fall has been successfully arrested. vii. The tie in point of the fall arresting system should also be able to support heavy loads viii. Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones, as well as securing, marking, and labelling covers for openings in floors, roofs, or walking surfaces	Contractor/ MUST	Construction phase	Daily	20,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	ix. Using a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels x. Maintaining clear traffic ways to avoid driving of heavy equipment over loose scrap i. Use of temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as hand rails and toe boards to prevent materials from being dislodged ii. Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes iii. Institute good site practices including prevent public access to the construction site by securing equipment and demarcate excavate, using warning signs with appropriate text (local language) and graphic displays; iv. Planning and segregating the location of vehicle traffic, machine operation, and walking areas, and controlling vehicle traffic through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic v. Ensuring the visibility of personnel through their use of high visibility vests when working in or walking through heavy equipment operating areas, and training of workers to verify eye contact with equipment operators before approaching the operating vehicle				

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	vi. Ensuring moving equipment is outfitted with audible back-up alarms vii. Using inspected and well-maintained lifting devices that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations. viii. Awareness campaigns /Education on HIV and STDs shall be provided to workers; ix. A well-stocked First Aid kit (administered by medical personnel) 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; x. Reporting mechanisms for the public to register concerns or complaints regarding perceived risks to their health Emergency contact details in the event of an accident shall be provided; xi. Training all contractor staff in emergency planning and management; xii. Developing a detailed health and safety plan and training all contractor staff on the plan. xiii. Training of workers in lifting and materials handling techniques in construction projects, including the placement of weight limits above which mechanical assists or two-person lifts are necessary xiv. Planning work site layout to minimize the need for manual transfer of heavy loads xv. Selecting tools and designing work stations that reduce force requirements and holding times, and				

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	which promote improved postures, including, where applicable, user adjustable work stations				
Acceleration of soil erosion	i. 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; ii. Maintain gravel fill and/or re-vegetate around the structures; iii. Unnecessary ground clearance and sensitive re-alignments shall be avoided; iv. Directing flow to properly designated channels; v. All excavation works shall be properly backfilled and compacted vi. Most of construction activities will be done during dry weather; vii. Mulching to stabilize exposed areas; viii. Designing channels and ditches for post-construction flows ix. Lining steep channel and slopes (e.g. use jute matting) and x. Reducing or preventing off-site sediment transport through use of settlement ponds, silt fences, and water treatment, and modifying or suspending activities during extreme rainfall and high winds to the extent practical.	Contractor/ MUST	Construction phase	Monthly	30,000,000
Generation of liquid waste	i. Contractor shall be instructed to put in place acceptable procedure for handling hazardous waste such as oils, lubricants and non-combustible waste;	Contractor/ MUST	Construction phase	Daily	5,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	ii. Construction workers shall be provided portable/temporary toilets (porta-potty) by contractor; and iii. Training on waste management shall be done for all personnel, operators and service providers.				
Generation of solid waste	i. The contractor shall have adequate facilities for handling the construction waste; and ii. Topsoil shall be stock piled and used for reclamation or re-vegetation at the site during landscaping. iii. Training on waste management shall be done to all personnel, operators and service providers. iv. All materials which can be reused shall be reused. v. Materials that cannot be reused shall be sent to an authorised dumpsite. vi. The contractor shall have adequate facilities for segregating, handling and storing the construction waste. vii. Topsoil shall be stockpiled and used for reclamation or re-vegetation at the site during landscaping.	Contractor/ MUST	Construction phase	Daily	2,000,000
Air pollution	***Impairment of air quality due to emissions*** i. Equipment shall be maintained in good running condition and equipment, which generate excessive black smoke shall not be used; ii. Enforce vehicle road restrictions to avoid excessive emissions from engine overloading, where practical switching off engines will be done when machines are not in use; iii. There will be routine inspection of equipment; iv. Turn off engines to reduce idling. ***Impairment of Air Quality Due to Dust***	Contractor/ MUST	Construction phase	Daily	6,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	v. Protect stockpiles of friable material subject to wind through wetting; vi. Cover loads with friable material during transportation; vii. Minimizing dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment (water suppression, bag house, or cyclone); viii. Minimizing dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content ix. Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements x. Avoiding open burning of solid xi. Restrict speed on loose surface roads to 30 km/hr during dry or dusty conditions; and, xii. Douse with water work sites with loose open soil to reduce dust generation when necessary				
Contribution to climate change	i. Equipment shall be maintained in good running condition and equipment, which generate excessive black smoke shall not be used; ii. Enforce vehicle road restrictions to avoid excessive emissions from engine overloading, where practical switching off engines will be done when machines are not in use; iii. There will be routine inspection of equipment; iv. Turn off engines to reduce idling; and v. Green spaces shall be maximized in project areas	Contractor/ MUST	Construction phase	Daily	3,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
Noise pollution	i. Avoiding or minimizing project transportation through community areas ii. Vehicles carrying construction materials shall be restricted to work during day time only; iii. Machine operators in various sections with significant noise levels shall be provided with noise protective gear; and, iv. Construction equipment shall be selected, operated and maintained to minimize noise. v. MUST shall include in tenders, employment contracts, subcontractor agreements and work method statements clauses that assure the minimization of noise and compliance with directions from management to minimize noise; vi. The Contractor shall be required to give preference to the use quieter technology or other mitigation measures rather than lengthening construction; vii. Regularly train workers and contractors (such as at toolbox talks) to use equipment in ways that minimize noise; viii. Ensure that site managers periodically check the site, nearby residences and other sensitive receptors for noise problems so that solutions can be quickly applied; ix. Avoid shouting, and minimize talking loudly and slamming vehicle doors; x. Keep truck drivers informed of designated vehicle routes, parking locations, acceptable delivery hours and other relevant practices (e.g. minimizing the use of engine brakes and periods of engine idling).	Contractor/ MUST	Construction phase	Daily	10,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
Generation of hazardous waste	i. Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids, ii. Using impervious surfaces for refuelling areas and other fluid transfer areas iii. Training workers on the correct transfer and handling of fuels and chemicals and the response to spills iv. Providing portable spill containment and cleanup equipment on site and training in the equipment deployment v. Assessing the contents of hazardous materials and petroleum-based products in building systems (e.g. PCB containing electrical equipment, asbestos-containing building materials) and process equipment and removing them prior to initiation of decommissioning activities, and managing their treatment and disposal vi. Assessing the presence of hazardous substances in or on building materials (e.g., polychlorinated biphenyls, asbestos containing flooring or insulation) and decontaminating or properly managing contaminated building materials vii. All hazardous materials shall be handled by registered personnel/company	Contractor/ MUST	Construction phase	Daily	5,000,000
Land pollution	i. There should proper separation of materials and wastes, -selection (e.g. more environmentally friendly, etc.), less use, proper storage, etc. ii. An efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at project areas.	Contractor/ MUST	Construction phase	Daily	10,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	iii. Ensure proper waste segregation and introduction of waste disposal bins, and warning notices, posted at strategic points; iv. No, on-site burial or open burning of solid waste shall be permitted. v. There should be proper procedure for handling hazardous waste such as oils, lubricants and non-combustible waste.				
Sub-total during construction phase					**117,000,000**
OPERATION PHASE					
Increased incidences of diseases and ill health	i. 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; ii. The project shall include information education and communication component (IEC) in its budget. This will help to raise more awareness on HIV/AIDS, and means to suppress its incidence; iii. Environmental sanitation systems shall be regularly improved; and, iv. Adequate medical services shall be made available at the University dispensary for meeting the population demand.	MUST	Operation phase	Daily	200,000,000
Increased pressure on social services/facilities and utilities	i. Use of water conservatively by instituting technologies (e.g. self-lock water taps) and awareness raising notices to users, etc.; ii. Construction of underground water reserve tank and introducing rainwater harvest system;	MUST	Operation phase	Daily	20,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	iii. Link to mandated structures to support improvement of social and infrastructural services at MUST and communities adjacent to the project area. iv. Duty to the community requirement may be applied to justify the construction of new social services infrastructures or cooperate with local structures to strengthen the existing social services infrastructures v. Extraction of underground water resources; vi. Alternative measures like use of solar power, drilling a borehole at site, water recycling shall be explored and implemented if found feasible. For instance, use of energy savers bulbs shall be given high priority; and vii. Use of air conditioning shall be kept to a minimum and maintenance of the cool indoor environment using natural ventilation system shall be strongly explored during the design process.				
Gender based violence	The Contractor 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.	MUST	Operation phase	Quarterly monitoring and Verification Report	5,000,000
Gender discrimination	This project will ensure that there is involvement of women in project activities.	MUST	Operation phase	Quarterly monitoring and Verification Report	5,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
Child labour	i. MRCC will conduct regular monitoring of project workers in relation to health, working conditions, hours of work, minimum age, and the other requirement of national law. ii. Work with local authorities and schools in the area to control school drop out iii. Cooperate with relevant authorities like Ministry of Labour to control child labour iv. Create awareness raising to the communities on the importance of education to the children v. The local authorities should develop bylaws to control the engagement of children in petty business or work in project related activities	MUST	Operation phase	Quarterly monitoring and Verification Report	7,000,000
Increased level of crimes	i. Establish community-based security in collaboration with village/ward leaders. ii. The community should be encouraged to participate in security matters by providing information on suspects iii. The cooperation of local people together will help to lessen criminal incidents and maintain security of people and their properties.	MUST	Operation phase	Quarterly monitoring and Verification Report	6,000,000
Increased runoff/storm water	i. The design of storm water drainage will be given a high priority; ii. Where feasible, rainwater harvesting will be used in proposed project sites to minimise generation of surface runoff; and, iii. The design shall provide sufficient greenery area for facilitating soil infiltration	MUST	Operation phase	Quarterly monitoring and number of complaints on health issues	80,000,000
Land pollution	i. Septic tank and soak away pits shall be designed in such a way waste treatment is achieved by 100%	MUST	Operation phase	Quarterly monitoring and	5,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	before disposal to the authorised disposal sites (UASB); and ii. No, on-site burial or open burning of solid waste shall be permitted. iii. Wastes not suitable for incineration and general municipal waste dumping (e.g. plastics, rubbers, tires, etc.) shall be removed for recycling, treatment, and/or disposal by a licensed contractor as appropriate. iv. There should be proper procedure for handling hazardous waste such as oils, lubricants and non-combustible waste v. Wastes not suitable for incineration and general municipal waste dumping (e.g. plastics, rubbers, tires, etc.) shall be removed for recycling, treatment, and/or disposal by a licensed contractor as appropriate.			Verification Report	
Health and safety risks due to fire hazards	i. Adequate number of portable fire extinguishers shall be placed at strategic locations; ii. Good housekeeping shall be maintained at all sites to reduce the fire risk; iii. The design of buildings shall strictly adhere to the Fire Safety Standards; iv. Regular fire and other disaster drills and awareness training shall be conducted; v. Fire detectors and sprinkler system shall be installed in the buildings; and vi. The proponent shall insure buildings against fire Hazards. vii. Install water tanks	MUST	Construction phase	Daily	50,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
Increased solid waste generation	i. MRCC management shall provide adequate waste handling facilities such as waste bins for waste segregation and recycling. Hazardous waste will be separated from non-hazardous waste for appropriate disposal by selling to the authorized dealers ii. A private cleanliness firm with adequate number of staff shall be commissioned to ensure cleanliness. iii. The skip buckets shall be emptied in authorized landfill twice a week. iv. All hazardous waste shall be handled by registered authorized dealers recognized by NEMC	MUST	Operation phase	Quarterly monitoring and Verification Report	6,000,000
Increased liquid waste generation	i. The campus shall have liquid waste to collect the wastewater (sewage) to treatment facilities found at the campus ii. The collected sewage follows the description given in Section 2.3.2.2 Description for waste water treatment facility.	MUST	Operation phase	Quarterly monitoring and Verification Report	150,000,000
Visual impacts	i. Locating noise development further away from the general public. ii. Light pollution can be reduced by keeping lighting (e.g. of parking lots) to the minimum levels needed for safety, and through the careful choice of light fixtures such as the use of flat-glass lanterns in car parks	MUST	Operation phase	Quarterly monitoring and Verification Report	3,000,000
Sub-total during Operation phase					**537,000,000**
DECOMMISSIONING PHASE					
Loss of employment	Seminars shall be conducted on alternative means of livelihood after termination of job	MUST	Decommissioning phase		10,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
Loss of aesthetics due to haphazard disposal of demolished waste	i. The debris resulting from the demolition will either be transported by a licensed waste transporter for dumping at an approved site or used as base material for new construction work; ii. All the necessary health and safety measures will be implemented including provision of personal protective equipment such as, safety harnesses, helmets, gloves, respirators, safety shoes, coveralls, goggles and ear protectors; and iii. Restoration of the affected land will involve the filling in of any open pits and grading the land to its natural contours, then planting appropriate tree species and under cover vegetation to hold the soil in place and to prevent flooding.	MUST	Decommissioning phase	Daily	50,000,000
Noise and Vibration	i. Planning activities in consultation with local communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance · ii. Using noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines. iii. Avoiding or minimizing project transportation through community areas iv. Water sprinkling shall be applied to open earth to reduce dust emission; v. Trucks transporting construction materials shall be covered if the load is dry and prone to dust emissions;	MUST	Decommissioning phase	Daily	50,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	vi. The demolition area shall be fenced with iron sheets; this shall prevent the dust at the ground to be picked up by the wind; vii. Public notifications shall be sent where appropriate especially in nearby residential areas likely to be impacted by dust; iii. Construction equipment, with noise sinks, shall be used; ix. Machine operators in various sections with significant noise levels shall be provided with noise protective gear x. Construction equipment shall be selected, operated and maintained to minimize noise				
Occupational Health and Safety	i. Training of workers in lifting and materials handling techniques in decommissioning projects, including the placement of weight limits above which mechanical assists or two-person lifts are necessary ii. Planning work site layout to minimize the need for manual transfer of heavy loads iii. Selecting tools and designing work stations that reduce force requirements and holding times, and which promote improved postures, including, where applicable, user adjustable work stations iv. Implementing administrative controls into work processes, such as job rotations and rest or stretch breaks v. Implementing good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from foot paths	MUST	Decommissioning phase	Daily	10,000,000

Identified Impact	Mitigation Measure	Responsible Institution	Time of mitigation	Monitoring frequency	Relative cost (TZS)
	vi. Cleaning up excessive waste debris and liquid spills regularly vii. Locating electrical cords and ropes in common areas and marked corridors iii. Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes ix. Using a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels				
Sub-total during decommissioning phase					**120,000,000**

CHAPTER NINE

9. ENVIRONMENTAL AND SOCIAL MONITORING PLAN

9.1. Environmental and Social Monitoring

Environmental and Social Monitoring Plan is an objective, periodical, reliable, and continuing process of observation and assessment of environmental changes (Table 9.2). Monitoring is a long-term process, which will start from the beginning of the project and will continue throughout the life of the project. Monitoring involves the continuous or periodic review of renovation/upgrading, operation and maintenance activities to determine the effectiveness of recommended mitigation measures. It is intended to ensure that the identified mitigation measures are implemented as recommended. It is therefore based on monitoring indicators, which will have to be compared with targets to gauge the effectiveness of the mitigation plans.

Table 9.1: Environmental and Social Monitoring Plan

Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Method	Target Level / Standard	Responsible Institution	Estimated Costs - TZS
Pre-construction Phase								
Waste generation	Environmental hygiene	Daily	Project site	Extent of pollution	Observation	Free from litter and waste water all over the project site	Contractor and MUST	35,000,000
Risk of accidents to workers	Reported cases of accidents Effectiveness in PPE use	Daily	Project site	Number of injuries	Record taking	OSHA 2003, Low risk to workers, No exposure	Contractor, MUST	20,000,000
Depletion/degradations of environmental resources from exploitation of borrow pits/quarries	Records on the construction material procured	Monthly	The site of resource exploitation	Affected resource	Observation	No degradation of landscape No Complaints from stakeholders		10,000,000
Construction Phase								
Deterioration of the air quality	Black smoke PM10	Daily	Project site	ppm	Mini-Vol Sampler	40 to 60 µg/Nm^3	MUST and contractor	25,000,000
	NO2	Monthly	Project site	Mg/l	Detector tubes	150 µg/Nm3 for 24-hours average value		
	SO2	Monthly	Project site	Mg/l	Detector tubes	average 100 µg/Nm^3		

Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Method	Target Level / Standard	Responsible Institution	Estimated Costs - TZS
						(0.129mg/kg) for 24hour		
	CO	Monthly	Project site	ppm	Mini-Vol Sampler	10mg/Nm^3 for 8hours		
Erosion of surface areas	Visible erosion	Weekly	Project Site	Level of erosions	Observation at the site	No indicators of erosion	MUST and Contractor	28,000,000
Noise and vibration	Noise levels, sound abatement measures in place	Weekly	Project site Receptor communities	dBA	Noise level Meter	Sound level shall not exceed 75 dB(A) daytime or 55 dB(A) at night	Contractor/ MUST	10,000,000
Accidental spillage of fuels	Fuel and hazardous material storage areas,	Once per week	Project site	mg/l	Spectrophotometer	Shall not exceed 15 ppm for hydro-carbons No leakage /spillage Of hydrocarbons	MUST and Contractor	15,000,000
Risk of accidents to workers	Reported cases of accidents Effectiveness in PPE use	Daily	Project site	Number of injuries	Record taking	OSHA 2003, Low risk to workers, No exposure	Contractor, MUST	26,000,000
Health and safety issues	Medical reports about diseases connected to	Monthly	Project site	Number of people infected	Medical examination	No cases of illness	MUST, contractor and Sumbawanga	36,000, 000

Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Method	Target Level / Standard	Responsible Institution	Estimated Costs - TZS
	working environment						District Council	
Operation Phase								
Waste generation	Environmental hygiene	Daily	Project site	Extent of pollution	Observation	Free from litter and waste water all over the project site	MUST	15,000,000
Conflicts among workers and the local population	Reported conflicts	Twice in a year	Areas around the project site	Number of conflicts reported	Counting conflicts reported	No conflict	MUST and Local community leaders	15,000,000
Increase of Storm Water Runoff that may lead to flooding in low lands.	Integrity of drainage system	Every year before rain seasons commence	Project Site	non	Observation	All drainage systems are in proper condition	MUST	12,000,000
Increase pressure on existing infrastructure (electricity, water supply and sewerage system)	Status of the available infrastructure	Annually	Project site	Capacity of infrastructure	Observation and mathematical computation	Infrastructure that suffices the population demand	MUST	20,000,000

Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Method	Target Level / Standard	Responsible Institution	Estimated Costs - TZS
Fire hazard	Presence and status of fire extinguishers, Emergency assembly site, trainings of fire	Every six months	Project site		Observation and status of fire extinguishers and Reading records	Fire extinguisher must not be expired, there must be an allocate assembly point, Trainings provided	MUST and Fire and rescue Force	16,000,000
Decommissioning Phase								
Contamination and impaired water quality	Ph	Daily	Project site and water bodies down stream	pH Meter	Sampling and analysis	+/- 0.05 from 7	MUST and Contractor	60,000,000
	Nitrate	Daily	Project site and water bodies down stream	mg/l	Sampling and analysis	30		
	Turbity	Daily	Project site and water bodies down stream	NTU	Sampling and analysis	< 25 NTU		
	Sulphate	Daily	Project site and water bodies down stream	mg/l	Sampling and analysis	600		

Potential Impacts	Parameter to be monitored	Monitoring Frequency	Monitoring Area	Measurement Units	Measuring Method	Target Level / Standard	Responsible Institution	Estimated Costs - TZS
	DO	Daily	Project site and water bodies down stream	mg/l	Sampling and analysis	Less than 75% of saturation concentration		
	Lead	Daily	Project site and water bodies down stream	mg/l	Sampling and analysis	0.05		
Job loss	Pension fund remittance	Once every year	Project Site	Number of Employees registered for pension fund	Workers register Book	All workers	MUST and Contractor	100,000,000
Noise and vibration	Noise levels, sound abatement measures in place	Monthly	Project site	dBA	Noise level Meter	Sound level shall not exceed 75 dB(A) daytime or 55 dB(A) at night	Contractor/ MUST	12,000,000

CHAPTER TEN

10. COST BENEFIT ANALYSIS

10.1. Financial Cost Benefit Analysis of the Project

Cost-benefit analysis is normally done in the framework of feasibility study of an activity. The aim of cost-benefit analysis is to assist the project developer to make decision on:

- Whether it makes economic sense to continue with the project;
- Whether the chosen option is cost effective alternative;

10.2. Quantifiable and Non-Quantifiable Benefits to Communities

There will be direct and indirect benefits to the communities as follows:

- The project will employ more than 150 for the construction and more than 100 personnel during the operation phase. Majority of the unskilled labourers will be recruited from the communities around the project area. The skilled and semi-skilled staff will be recruited from within Tanzania, Rukwa and neighbouring regions in particular.
- Through taxes to the Government, Sumbwanga District Council will be indirectly contributing to development projects such as roads, medical care, education and other social services.

10.3. Quantifiable and Non-Quantifiable Benefits to Government

The government of Tanzania will directly benefit from taxes collected from factory and other small business people who will be using the facilities or supplying materials. Apart from tax generation, the investment will also enhance the economic growth and ancillary private sector development spurred by the operations and activities associated with the business.

10.4. Possible Costs to Communities

It is a fact that business entails social and environmental impacts. These have been elaborated clearly in earlier chapters. There will be individuals in the communities who will be affected more than others. However, MUST is committed to mitigate the negative social and environmental impacts.

10.5. Environmental Cost Benefit Analysis

Environmental cost benefit analysis has been assessed in terms of the negative versus positive impacts. Furthermore, the analysis is considered on whether the impacts are mitigatable and the costs of mitigating the impacts are reasonable. The environmental impacts are reasonably mitigatable and the financial resources needed to mitigate negative impacts, when compared to the required investment, are manageable by the proponent.

10.6. Social Economic Cost Benefit Analysis

10.6.1. The Estimate of the Size of a Project

The project aims at constructing an academic block and Rural Technology Park. The project is aimed at increasing the enrolment of student at the MUST Rukwa Campus and therefore increasing manpower in the country in various fields of specialization. The facilities will have the capacity to serve more 2,000 students and academic staff.

In this context, the proposed project will be implemented at Rukwa Campus area that has already been set aside and already compensated. The area is about 47.34 hectares of which only about 50% of the area has been developed.

For the purpose of implementing this business plan, the Rukwa Campus has established the following construction costs (Table 10.1):

Table 10.1: Project Cost

S/N	Type of Block	Description	Construction Cost	Total Costs
1	Academic Blocks	Construction	3,750,000,000.00	3,750,000,000.00
2	Rural Technology Park	Construction	2,300,000,000.00	5,000,000,000.00
3	Workshops	Construction	1,875,000,000.00	1,875,000,000.00
	TOTAL			**10,625,000,000.00**

Therefore, the total cost for the facilities is approximately TZS 10,625,000,000.00.

10.6.2. Revenue Projections of the Project

Cost-benefit analysis is normally done in the framework of feasibility study of an activity. The aim of cost-benefit analysis is to assist the project developer to make decision on:

- Whether it makes economic sense to continue with the project;
- Whether the chosen option is cost effective alternative;
- The estimate of the size of a project.

Considering a lifespan of 30 years (reinforced concrete structures) of the project, the costs of construction activities will include:

- Capital expenditures based on market estimates. The present value cost is TZS. 10,625,000,000.00.
  - Operating and Maintenance costs:
- The present value operating cost has been estimated to be TZS 55,966,660.00 per month
- Revenue collection from students' fees is TZS 180,766,673.33 per month (this

assumed to be from the current student population of 2000)

The discounted rate for the 2022 is 0.10 and the breakeven for the Net Present Value is on the 15th year. The estimated project lifespan is 8 years and the benefit cost ratio is 1.09. Therefore, the project is feasible.

CHAPTER TEN

11. SUMMARY AND CONCLUSION

11.1. Summary

The Environmental Impact Assessment (Environmental Issues) Study has been completed in accordance with the Tanzanian Legislations including the Environmental Management Act (2004), the Environmental Impact Assessment and Audit regulations (2005). The Environmental Studies Team has carried out field surveys to collect the environmental and some social data and to discuss with the regional and local authorities concerning the environmental issues of the proposed construction project at MUST Rukwa Campus. The Team also carried out consultation with the representatives of the Rukwa Regional Secretariat, Sumbawanga District Council and local communities around the project area and students so as to integrate their requirements in the project. Also, this consultation enabled the Consulting team to have a physical feeling of the local conditions around the project site.

The Environmental Impact Assessment report has identified a number of impacts both positive and negative and other residual cumulative issues pertaining to the proposed construction of an Academic Blocks, Workshops and Rural Technology Park at MUST Rukwa Campus in Rukwa Region. The issues/impacts have been described and assessed in detail to gain adequate understanding of possible environmental effects of the proposed project - from site selection to decommissioning, in order to formulate mitigation measures in response to negative aspects which have emerged. The Environmental Management Plan provides way forward for implementation of the identified mitigation measures.

The estimated costs for implementing the mitigation measures are just indicative. The consultant has used informed judgment to come up with these values. The study finds that although the project can have significant and wide-ranging impacts on the environment, the project is environmentally suitable and socially acceptable, subject to the implementation of the Environmental Management Plan and Environmental Monitoring Plan as proposed in Section 8 and 9.

11.2. Conclusion

It is recommended that based on the findings of the Environmental Impact Assessment exercise and supplementary information, the project proponent (MUST Rukwa Campus) should implement the Environmental and Social Management Plan (ESMP). The ESMP provides guidelines on managing/mitigation of impacts and monitoring performance.

In addition to the environmental management plan, it is recommended that MUST Rukwa Campus shall establish an Environmental Control Unit which will be responsible for monitoring the application of the environmental management plan, as well as dealing with ad hoc and unforeseen issues which need to be mitigated.

While a number of environmental impacts have been identified and assessed, none of these are considered to be severe after mitigation as to prevent further planning, design and construction

of the proposed development. MUST has the opinion that the environmental impacts identified may be mitigated. The proposed environmental management plan and environmental monitoring plan if implemented will safeguard the integrity of the environment.

REFERENCE

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Tanzania Bureau of Standards National Environmental Standards Compendium. Tzs 860: 2005 Municipal and Industrial Wastewaters - General Tolerance Limits For Municipal And Industrial Wastewater.

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

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United Republic of Tanzania: Engineers Registration (Amendments) Act, 2007.

United Republic of Tanzania: Environment Management Act, No. 20 of 2004.

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

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

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

United Republic of Tanzania (2021) The United Republic of Tanzania, Regional Administration and Local Government.

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Vasile Dumbravă and Titu Maiorescu, Using Probability – Impact Matrix in Analysis and Risk Assessment Projects (2013).

APPENDICES

Appendix I: NEMC letter regarding ToR approval

THE UNITED REPUBLIC OF TANZANIA

VICE PRESIDENT'S OFFICE
UNION AND ENVIRONMENT

NATIONAL ENVIRONMENT MANAGEMENT COUNCIL (NEMC)

In reply please quote:

Ref: HG.145/435/01/01 Date: **08/02/2022**

Vice Chancellor,
MUST,
P. O. Box 131,
Mbeya

RE: APPROVAL OF TERMS OF REFERENCE (ToR) FOR THE PROPOSED CONSTRUCTION OF ACADEMIC AND RURAL TECHNOLOGY PARK BLOCKS TO BE BUILT AT MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY RUKWA CAMPUS IN RUKWA REGION

Refer to the above-captioned subject.

2. The National Environment Management Council (NEMC) through its Western Zone (WZ) acknowledges receipt of dully filled registration form (Form No. 1) and a copy of Scoping Report and Terms of Reference for undertaking EIA for the above-mentioned project.

3. The Council has reviewed the submitted scoping report and ToRs and found it to be adequate thus can be used to guide Environmental Impact Assessment (EIA) study of the named project. Your project falls under '**type A Project' which requires fully EIA study to be undertaken.** Therefore, the Council is emphasizing that you undertake EIA study as required by the Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations, 2018 that is read as one with the Environmental Impact Assessment and Audit Regulation, 2005 which hereinafter referred to as the "Principal Regulations."

4. In addition, the EIA study should adequately incorporate the following but not limited to: -

Western Zone Office, 1st Floor NSSF Mafao House, Mnarani Street, P.O.Box 974, Kigoma /Ujiji, Tanzania,
Phone: +255 738 037307; e-mail: nemckigoma@nemc.or.tz Website: www.nemc.or.tz

i. Describe projects activities in each phase of the project cycle and present physical, biological and socio-culture environment that would be directly or indirectly affected by the development.

ii. Describe the existing environment characteristics of the place with reference to the; - Physical Environment e.g. the dust levels of the particular environment, socio- Culture and Economic Environment.

iii. All key stakeholders pertinent to the project including various levels of LGA (Village, Ward, District), government institutions and NGOs relevant should be consulted and their views and concerns should be well addressed. Take note also that records of meetings, communications are provided in the report. Likewise, Consultation forms should bear **dates**, and each consulted stakeholder should **sign** against his/her **name** as the law requires;

iv. All Experts involved in the EIA study should **sign** the report and be indicated whether he/she is a registered or non-registered environmental expert, Failure to observe this requirement, will constitute an offence as per EMA Cap 191;

5. After completion of the Environmental Impact Assessment study, the EIS should be uploaded in the Online Project Management System (PMS). Upon submission, you will be required to pay review charges to the Council as indicated in the Proforma Invoice which will be generated by the system. The review charges exclude transport cost of three Officers to and from the project site during Site Verification. The transport cost shall be incurred by the project proponent and the Council will inform you of the dates for the site verification after confirming payment of the review charges.

6. Should you need additional information or clarification on this matter, please contact us through Mobile No. or +255 754 928 486.

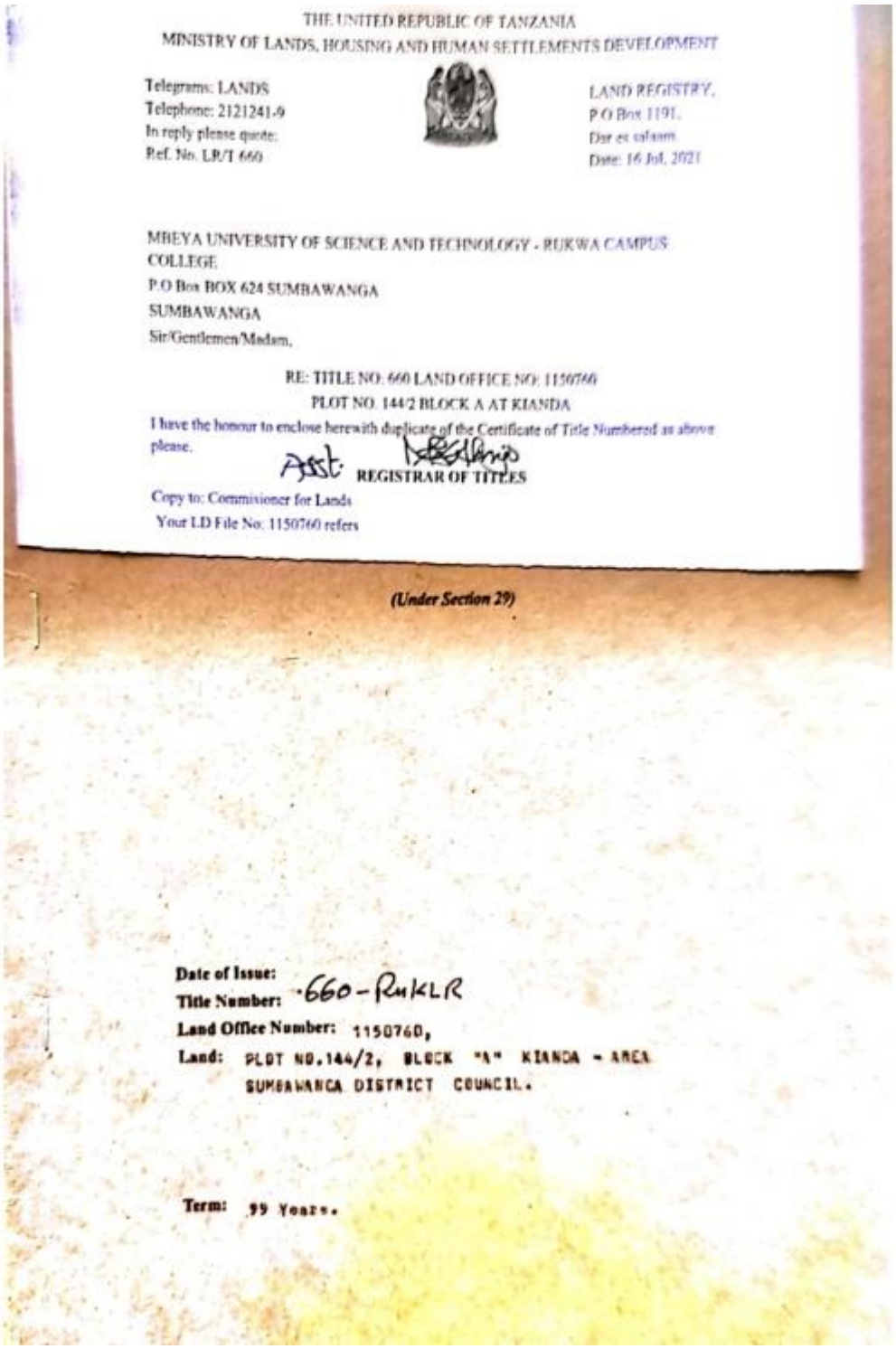
7. Thank you for your continued collaborative initiatives on Environmental Management.

Benjamin Dotto
Zonal Manager
NEMC WESTERN ZONE

Zonal manager (NEMC)
Western Zonal Office. NSSF House, 1st Floor
P.O. Box 974
Kigoma /Ujiji

Copy: Prof. Zacharia Katambara
P. O. Box 131,
Mbeya.

Appendix II: Title Deed



THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF LANDS, HOUSING AND HUMAN SETTLEMENTS DEVELOPMENT

Telegrams: LANDS
Telephone: 2121241-9
In reply please quote:
Ref. No. LR/T 660

LAND REGISTRY,
P.O Box 1191,
Dar es salaam.
Date: 16 Jul, 2021

MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY - RUKWA CAMPUS COLLEGE
P.O Box BOX 624 SUMBAWANGA
SUMBAWANGA
Sir/Gentlemen/Madam,

RE: TITLE NO. 660 LAND OFFICE NO. 1150760
PLOT NO. 144/2 BLOCK A AT KIANDA

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

Asst. REGISTRAR OF TITLES

Copy to: Commissioner for Lands
Your LD File No. 1150760 refers

(Under Section 29)

Date of Issue:
Title Number: 660-RuKLR
Land Office Number: 1150760,
Land: PLOT NO.144/2, BLOCK "A" KIANDA - AREA SUMBAWANGA DISTRICT COUNCIL.

Term: 99 Years.

TITLE No: 660-RUKLR
REGISTERED ON: 16-07-2021
AT: 10.00 A.M
Senior Asst. Registrar of Titles

TANGANYIKA STAMP DUTY ACT
Stamp Duty Shs: 1900/=Paid
On Original Receipt Shs: 92118005486515B
of: 29-06-2021
Stamp Duty Officer

TANGANYIKA STAMP DUTY ACT
Stamp Duty Shs: 100/=Paid
Receipt No: 92118005486515B
of: 29-06-2021
Stamp Duty Officer

THE UNITED REPUBLIC OF TANZANIA

THE LAND ACT, 1999
(NO. 4 OF 1999)

CERTIFICATE OF OCCUPANCY

(Under Section 29)

Title No. 660-RUKLR
L.O. NO.1150760.
LD/SDC/13

The 15th **Day of** July **Two Thousand Twenty One**

THIS IS TO CERTIFY that **MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY** established pursuant to Mbeya University of Science and Technology Charter of 2013 of P.O. Box 624, Sumbawanga (**RUKWA CAMPUS COLLEGE)** (hereinafter called "the Occupier") **is** entitled to the 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 **July, Two Thousand Twenty One** according to the true intent and meaning of the Land Act and subject to the provisions thereof and to any regulations made thereunder and to any enactment in substitution thereof or amendment thereof and to the following special conditions:-

1. The Occupier having paid rent up to the thirtieth day of June, **2022;** shall hereafter pay rent of shillings **Five Thousand (5,000/=) only** a year in advance on the first day of July in each of the term without deduction PROVIDED that the rent may be revised by the Commissioner for Lands.

2. The Occupier shall:-

   (i) Be responsible for the protection of all beacons on the land throughout the term of the Right. Missing beacons will have to be re-established at any time at the Occupier's expenses as assessed by the Director responsible for Surveys and Mapping.

(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) Building to be in permanent materials.

(iv) Building plans to be submitted to the **Sumbawanga District Council** within six months from the date of the commencement of the Right.

(v) Building construction to begin within six months after approval of the plans.

(vi) Building to be completed within thirty six months from the date of the commencement of the Right.

3. **USER:** The land shall be used for **Education** purposes only. Use Group **'K'** use classes **(d)** as defined in the Urban Planning (Use Group and Use Classes) (Use Classes) Regulations, 2018.

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 and in public interest.

SCHEDULE

ALL that Land known as Plot No. **144/2** Block **'A'** situated at **Kianda Area** in **Sumbawanga District** containing **Forty Seven Point Three Four (47.34) Hectares** shown for identification only edged **red** on the plan attached to this Certificate and defined on the registered Survey Plan Numbered **136222** deposited at the Office of the Director for Surveys and Mapping at Dar es Salaam.

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

ASSISTANT COMMISSIONER FOR LANDS

I,the within named **MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY** hereby accept the terms and conditions contained in the foregoing Certificate of Occupancy.

SEALED with the **COMMON SEAL** of the said **MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY** and Delivered in the presence of us this 1ST Day of JULY 2021

Signature:.....

Postal Address: P.O.BOX 624 SUMBAWANGA

Qualification: VICE CHANCELLOR

Signature:.....

Postal Address: P.O BOX 5374 Dares-Salaam

Qualification: Chairperson

SUMBAWANGA DISTRICT COUNCIL

LOCATION ..... KIANDA

BLOCK ..... 'A'

PLOT NO 144/2

L.O. No 1150760

AREA 47.34Ha

This Plan prepared in accordance with Registered Plan No 136222

is Approved for the purpose of the Land Registration Ordinance

Director for Survey and Mapping.....

Date.....30/06/2021.....Survey and Mapping Divission

Ministry of Lands, Housing and Human Settlement; Dodoma.

The issue of this plan implies no guarrantee

or admision of the tittle the Gorvernment

Appendix III: Name of stakeholders consulted and their signature

EIA FOR THE PROPOSED CONSTRUCTION OF COLLEGE OF ENGINEERING AND TECHNOLOGY (CET), COLLEGE OF ARCHITECTURE AND CONSTRUCTION TECHNOLOGY (COACT) AND ENVIRONMENTAL AUDIT FOR EXISTING INFRASTRUCTURE AT MUST MAIN CAMPUS

STAKEHOLDER CONSULTATION

NAME	POSITION/TITTLE	CONTACT	SIGNATURE	DATE
DAVID E KILOWO		0763572229	[signature]	18/10/2021
GODFREY D. HAULE	CIA – RS	0758 558574	[signature]	18/10/2021
DONALD. L. NSSOKO	Ag AAS – HRM	0767 984780	[signature]	18/10/2021
MAGRETH CHIPETA	Lums	0766413749	[signature]	18/10/2021
ROGAN R. MSABAWA	HoRO	0765 150291	[signature]	18/10/2021
JACKSON BWIRE	ENGINEER – SUMAJKT	0754 584 528	[signature]	18/10/2021
MOHAMED MHANDO	Ag. RM – TBA RUKWA	0713 987471	[signature]	18/10/2021
CPA Sossiness J. Mutanubukwa	CA – RS	0753153601	[signature]	– " –
SALEAT H. MSANGA	Ag AAS – EBS	0714-572860	[signature]	– " –
Revocatus A. Kassimba	PIO	0735 448929	[signature]	– " –
Mashaka A. Mwanjali	MCHUMI – RS	0764578541	[signature]	18/10/2021

EIA FOR THE PROPOSED CONSTRUCTION OF COLLEGE OF ENGINEERING AND TECHNOLOGY (CET), COLLEGE OF ARCHITECTURE AND CONSTRUCTION TECHNOLOGY (COACT) AND ENVIRONMENTAL AUDIT FOR EXISTING INFRASTRUCTURE AT MUST MAIN CAMPUS

STAKEHOLDER CONSULTATION

NAME	POSITION/TITTLE	CONTACT	SIGNATURE	DATE
Eng. Daudi E. Sebyiga	AAS - INFRASTRUCTURE	0754 449725		18/10/2021
William N Mukasuma	Ag AAS - EOM	0784630346		18/10/21
Ally M. Ruhela	Ag. AAS - HEALTH	0754606527		18/10/2021
Chunda F.S	H/Pmn	07 54 433535		18/10/2021
LIGHTNESS S. MSEMO	DED	0767487474		18/10/2021
RAPHAEL ILANGA	Ag DPLO	0784461814		18/10/2021
CHANDE A. JUMA	SLNRO	0756335186		18/10/2021
GODFREY MANFI	Ag DESWMO	0763-971163		18/10/2021

ESIA FOR THE PROPOSED CONSTRUCTION OF RURAL TECHNOLOGY PARK AND CONSTRUCTION OF ACADEMIC BLOCK AT MUST RUKWA CAMPUS COLLEGE IN SUMBAWANGA DISTRICT, RUKWA REGION.

STAKEHOLDER MEETING 5TH AUGUST, 2022.
ATTENDANCE

S/N	NAME	POSITION	CONTACT	SIGNATURE
1.	ASF. GERVAS. D. FUNGAMALI	Regional fire Officer	0759003419 0736800084	[signature]
2.	LUSAJO. S. MBOLI (IPSP)	STAFF OFFICER	0757360463	[signature]
3	GEOFREY. G. MWAMBUNGUCINSP	PREY	0621013559	[signature]
4	YUSUFU AUGUSTINO	FIRE MARSHALL	0628598472	[signature]
5.	SSGT ANDREW YONA MAPUNDA	ESTATE OFFICER	0655622213	[signature]
6	Dr. Linda Salekwa	Gender specialist	0718658695	[signature]

Appendix IV:Minutes from Students Organization

CHUO KIKUU CHA SAYANSI NA TEKNOLOJIA MBEYA

MUST NDAKI YA RUKWA

Ripoti ya kikao cha Tarehe 27.04.2023 cha Wanafunzi kuhusiana na uwezeshaji wa mradi wa HEET Chuo kikuu cha Sayansi na Teknolojia Mbeya

1: MAHUDHURIO

1.1 Wanafunzi wote,

1.1.1 wawakilishi kutoka ofisi ya mshauri wa wanafunzi na

1.1.2 wageni wa mradi wa **HEET** kutoka MBEYA.

2: UTANGULIZI

Mlezi wa wanafunzi kwa kushirikiana na serikali ya wanafunzi walifungua kikao majira ya 3:40 asubuhi kwa kuwakaribisha wanafunzi wote pamoja na wageni kutoka kampasi kuu ya chuo na wajumbe wa mradi wa **HEET** na kuwaalika kwa ajili ya kikao baada ya kufanya utambulisho na kufahamiana.

3: AGENDA

3:1 Kikao kilikuwa na agenda **nne** nazo ni;

3.1.1 Kutoa mtazamo wetu kuhusiana na mradi wa **HEET** kwa kutoa kauli ya kukubali au kukataa mradi usiwepo

3.1.2 Kutoa maoni nini kifanyike kutokana na mradi wa **HEET**.

3.1.3 Shukrani za wanafunzi kupitia katibu wa Elimu MUSTSO Ndaki Rukwa.

3.1.4 Mwisho wa kikao kupitia Mbunge wa MUSTSO Ndaki ya Rukwa.

5.1.3 Hata hivyo ni vyema wakati tunaendelea kupata unufaikaji kuhusu mradi vilevile ni vizuri kuongeza juhudi za kutanua mitaala ili kupata wanafunzi wengi Zaidi wakati mradi unafanyiwa kazi, mwisho wa maoni ila sio kwa umuhimu ni kwamba kama itawapendeza ndugu, viongozi ni vyema wakati mambo yote yanaendelea kuweze kuwa na kozi fupi ili chuo kiweze kupata Zaidi fedha na watu muda wote kama vile kozi za kompyuta, udereva, mapishi na upambaji n.k.

6. MENGINEYO:

Neno la shukrani kwa upande wa wanafunzi ndaki ya Rukwa kupitia katibu wa elimu na taaluma **MUSTSO**, tunawapongeza sana ndugu viongozi kwa kuweza kutambua uwepo wetu na kutufanya moja ya wadau au washiriki wa mradi kwa njia moja au nyingine, karibuni tena na tena sisi tutakuwa tayari muda wote kuwasikiliza na kwakuamini tunajenga chuo chetu kuzidi kuwa kikubwa Zaidi na Zaidi Ahsanteni sana.

7. MWISHO

mwenyekiti wa kikao ambae ni Mbunge wa MUSTSO ndaki ya Rukwa aliwashurukuru wajumbe wote kwa kuweza kutoa ushirikiano mzuri kwenye kikao kwa kuchangia hoja zao na mawazo kuhusu mradi pendwa wa **HEET** kwa kuletwa ndaki ya Rukwa na kufunga rasmi kikao saa 05:50 asubuhi.

MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY
PRINCIPAL MUST RUKWA CAMPUS COLLEGE (MRCC)
P.O.BOX 624 SUMBAWANGA

JUSTIN C. MYOVELA	TAREHE	ABDU I. SEIF
.....	27.04.2023.	.....
MWENYEKITI MUSTSO (MRCC)		**KATIBU MUSTSO (MRCC)**

MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY

ACTIVITY: STAKEHOLDERS' MEETING (STUDENTS)

DATE: 27/04/2023

VENUE: LECTURE ROOM ONE (1)

S/N	NAME	REG. NUMBER	POSITION	COURSE	YEAR OF STUDY	PHONE NUMBER	SIGN
01	AZIZ J. MAGORI	21201223200005	STUDENT	DME-2YR	2 YR	0733891497	PJfoil
02	FRANK A. JOHANES	22202300030006	STUDENT	BME	1 YR	0717664985	FAJohanes
03	LAZIA J. MIRAJI	22201234430001	STUDENT	BME	1 YR	0693083866	[illegible]
04	CHRISTIAN MWANDU	22201234430012	STUDENT	BME	1 YR	0755504668	C. Mwandu
05	MWINULA LIMBE	22201234430013	STUDENT	BME	1 YR	0620578767	[illegible]
06	DANIEL BALTAZAR	19200123010008	STUDENT	MIE	3 YRD	0758462629	[illegible]
07	MECHALK B. MGENI	22201232000007	STUDENT	D.M.E	1 YR	0769854767	M.B. Mgeni
08	WILSON LAZARO	22201411420004	STUDENT	C.BA	1 YR	0786059812	W. Lazaro
09	OCTAVIAN G. KALULU	22201225200059	STUDENT	D.M.E	1 YR	0621826980	[illegible]
10	SAMWEL L. MAGABELA	22201234430015	STUDENT	BME	1 YR	0685 452 421	[illegible]
11	NOVATUS PROCHES SIRIKO	21201223200010	STUDENT	D.M.E	2nd Yr	0629755712	[illegible]
12	AUGUSTINE LUCAS	22201223200060	STUDENT	D.M.E	1st Yr	0645730513	[illegible]
13	SALMON SALVATORY	22201433330009	STUDENT	B.B.A	1st Yr	0622117976	[illegible]
14	STIVEN DEZDERY	22201411420007	STUDENT	CBA	1st Yr	0621934165	SDSimfowe
15	TAIKO LONGINO	21201425210007	STUDENT	DBA	2nd Yr	0754553478	[illegible]
16	Thomas Martine	22201423210021	STUDENT	DBA	1st Yr	0746713273	[illegible]
17	NTAHONDI JAVAN	22201234430019	STUDENT	BME	1st YEAR	0742714716	N.J. Ntahondi
18	TABITHA KOMBA	21201223200001	STUDENT	DME	2nd YEAR	0623339611	T.E. Komba
19	Grace Julius	21201423210012	Student	DBA	2 Year	0765794095	[illegible]
20	STEVEN MAGAFU	22201433230003	Student	BBA	1st Year	0684880643	[illegible]

MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY

ACTIVITY: STAKEHOLDERS' MEETING(STUDENTS)

DATE: 27/04/2023

VENUE: LECTURE Room ONE (1)

S/N	NAME	REG. NUMBER	POSITION	COURSE	YEAR OF STUDY	PHONE NUMBER	SIGN
01	JUSTIN C MYONELA	2020123200003	LEADER OF STUDENT	DME	3rd Year	0754915837	
02	SALMA M. ABDALLAH	212012232000007	V/CHAIR OF JUDICIARY	DME	2nd Year	0712439622	
03	ABDU IDDY SEIF	212014232100008	K/ELIMU MUSIC	DBA	2nd	0744671910	
04	NEVA · U · MWANJASU	222014232100024	—	DBA	1st	0693854820	
05	FRANCIS · B · MWELEZO	222014232100220	—	DBA	1st	0614154310	
06	BAZA B. LUBUYE	222014232100218	—	CBA	1st	0745873949	
07	IBADH · O · MUSEMA	222014232100231	—	DBA	1st	0754042799	
08	SHEMSA ABR	222014232100222	STUDENT	DBA	1st	0746959939	
09	EMMANUEL G MAGESA	222014232100219	STUDENT	BBA	1ST	0627434383	
10	SHARONI JAMES NYANDAO	212012232000221	STUDENT	DME	2nd	0629344919	
11	STEDY DANIEL MWAMANILE	2020032300085	STUDENT	DME	3	0689948814	
12	ZEPHA NIM OFFICER	2020032300011	Student	BBA	1	0752978230	
13	KULWA FAUSTINE	212012344300001	Student	BME	2	0789897022	
14	EVARIST PAUL JHILA	212012232000003	STUDENT	DBAE	2	0768057027	
15	RAMADHANI M. RWAMBU	222012320000005	STUDENT	DME	1	0683370542	R.M.R
16	BETH JULIUS DANIEL	212012232000012	STUDENT	DME	2nd	0628445750	B.J.Daniel
17	LIGHTNESS KALENGA	212012232000022	STUDENT	DME	2nd	0758767691	L.M.Kalenga
18	ANGEL SANGA	222014232300012	STUDENT	BBA	1st	0754970633	
19	MKOME T. JUMA	202012344800021	student	BME	3rd	0756218813	
20	BENSON T. GABRIEL	202012320000 2	STUDENT	DME	3rd	0769810785	

Appendix V: Minutes from Kianda community

HALMASHAURI YA WILAYA YA SUMBAWANGA
MKUTANO WA HADHARA ULIOKEII SIKU YA TAREHE
27/04/2023.

V. AJENDA ZA KIKAO / MKUTANO

1. KUFUNGUA MKUTANO
2. KUIAMBULISHWA KWA MRADI WA MAJENGO YA GHOROFA YAIIKA YA MPAS YA CHUO KIKUU CHA SEIENGE NA TEKNOLOJIA MBEA KAT PAS YA RUKWA MRADI TOKA BANKI YA DUNIA
3. MAONI YA WANANCHI
4. KUFUNGA MKUTANO:

Mkutano umefunguliwa na Mwenyekiti wa kijiji Unam saa 10:05 za jioni, Mwenyekiti aliwashukuru wageni na kuwakaribisha na aliweka Mkutano Wazi.

Utambulisho, Afisa Mtendaji aliwatambulisha wageni kwa wananchi ili wawatambue.

Kutambulishwa kwa Mradi wa Majengo ya ghorofa ya kampas ya chuo kikuu Must cha sayansi na teknolojia Kahika kampasi ya Rukwa, ni Mradi toka banki ya dunia Wataalam kutoka chuo kikuu waliotembelea wananchi Mambo Mbalimbali kama ifuatavyo

- Kutakua na Elimu ya Vitendo
- Utathili Unatoka banki ya dunia
- Kuboresha Mazingira
- Kuongeza Ubora wa elimu kwa kutumia Mitandao
- Kutakua na Majengo ya aina Mbili
  * Maktaba na ofisi za Walu
  * Karakana.
- Masomo ya kilimo pia yatakuwepo kuanzia ngazi ya cheti mpaka degree.
- Walimu wameandaliwa kwa kuboa elimu bora

- Hata kama kutakua na Magonjwa ya Mlipuko shule zitaendelea kwa sababu elimu itaboreshwa zaidi kwa sababu ni elimu ya Mtandao ulioboreshwa.
- Wananchi waweze kukubali Mradi huu na waji tokeze kwa wingi kushiriki katika Maendeleo.
- Mradi utakusanya Watu wengi toka sehemu Mbali Mbali hivyo kutakua na Muingiliano wa Mambo mengi hivyo Umakini na kuelimishana Inatakiwa kwa sababu ya watu wanakuja na tabia tofauti
- Wananchi watapata fursa Mbali Mbali kwa ajili ya Maendeleo yao wenyewe hivo washiriki kwa nguvu ili wawezi kufaika kwa Maendeleo yao.
- Inahitajika ulinzi, Wananchi wawe walinzi kwa vitu kavyokua Vinafanya kazi katika ujenzi huo.
- Watoto wenye Mahitaji Maalumu watakua na Sehemu yao kwa ajili ya kupata elimu, pia Wamama wenye watoto wachanga watakua na sehemu yao ya kupata elimu bila ya Usumbufu wowote.
- Kama kuna Malalamiko, pongezi au Maoni yatapokelewa Shuleni kwa simu, barua au Vikaratasi.
- Dawati la jinsia pia litakuwepo.
- Magonjwa Wananchi kwa Makini sababu ya Muingiliano wa watu.

Maoni ya Wananchi; Mafundi wa kata hii wata nufaikaje,
- Je watawezaje kuwadaili Wanafunzi wa kata hii
- Wananchi Wanaomba Wakandarasi watoke katika kata ya Lyangalile.
- Ushirikishwaji wa kazi Mbali Mbali
- Wanapotuma Maombi wasiombwe Rushwa

Majibu toka kwa Wataalamu.

Mtanzania yoyote ana uwezo wa kufanya kazi kuanzia umri wa Miaka 18 na kuendelea, Inatakiwa kufuata taratibu za Maombi na kama huwezi kufuata chuo wanatoa Maelekezo namna ya kuomba.

- Rushwa, Ili Wananchi wenaomba Wan: kwa haki na yeyote atakaeombwa Rushwa basi alipotiwe chuo hatuka sana.

- Mradi wa benki ya dunia Ina Uwazi wa hali ya juu ndio Maana Inawasikiza wananchi wa sehemu husika zaidi.

Wananchi wote kwa ujumla Wameukubali Mradi kwa moyo mmoja na wameahidi kutoa ushirikiano wa hali ya juu kwani wanahitaji Maendeleo.

Kufunga Mkutano, Mkutano Umefungwa na mwe nyekiti wa kijiji Mnamo saa 11:30 za Mchana na akiwashukuru Wataalamu kwa hamasa nzuri na Wananch kwa kuumiliwa wao.

AFISA MTENDAJI
KIJIJI CHA KIANDA
S.L.P 229 S'WANGA
sahihi ya Veo

MIKITI SERIKALI
KIJIJI CHA KIANDA
S.L.P 229 SUMBAWANGA
sahihi ya Mwenyekiti

VIONGOZI

CHUO KIKUU CHA SAYANSI NA TEKNOLOJIA MBEYA

KIKAO CHA WADAU (STAKEHOLDERS' MEETING) WA KATA YA LYANGALILE

MAHUDHURIO 27/04/2023

Na	JINA	CHEO	KIJIJI	NAMBA YA SIMU	SAHIHI
1.	IBRAHIM J. MWILWA	MW/KITI SERIKALI	KIANDA	0628375431	I. Mwilwa
2.	RESTRIDA K. NESTORY	VEO	KIANDA	0756383985	[illegible]
3.	RICHARD. G. KACHELE	MWENYEKITI KIONGOZI MTAFENDA	KIANDA	0752786228	Rachele
4	SOWALIGHA V. BLUMA.	MWENYEKITI [illegible]	KIANDA	0712286523	[illegible]
5.	PAULO G. ULAYA	MJUMBE	KIANDA.	0766732128	P. ulaya:
6	PAULO V. KUSONGWA	MJUMBE	KIANDA.	0786910078.	[illegible]
7.	VESTINA NDUNGURU	WEO	LY KIANDA	0628151497	V. Ndunguru
8	CALUS V LEMI	MW/MTENDAJI K. KIANDA	KIANDA	0656648948	[illegible]
9	PETER LAURIAN	AFISA MILIKI	MUST - RUKWA	0765-182245	[illegible]
10	PATRICIA MURAGURI	AFISA MAWASILIANO (HEET)	MAIN CAMPUS	0757003274	[illegible]
11.	LAWRENCE SILABI	A/MIPANGO - MUST	MAIN CAMPUS	0752083658	[illegible]
12	BEATRICE MAKYAO	SOCIAL SPECIALIST	MUST	0768549829	[illegible]

Na	JINA	CHEO	KIJIJI	NAMBA YA SIMU	SAHIHI
16	RODRIKA MIKWAU	~~KIANDA~~ Bamukia	KIANDA	06*375293	[illegible]
17	FRANCE EDIMUNDY	Mkulima	KIANDA	0689905415	[illegible]
18	SILILO SUWI	MKULIMA	KIANDA	0622 385493	S.Suwi
19	Egidi Saili	Mkulima	KIANDA		E.Saili
20	DEOGRATIS ZAYANI	mkulima	KIANDA	0766335903	zayani
21	KADINSY MAGEMBE	Mkulima	Kianda	— —	K.Magembe
22	BENJAMIN MWANISENGA	Mkulima	KIANDA	— — —	[illegible]
23	MAIKO SIMWENE	mkulima	KIANDA	0785503604	Msimwene
24	SABASI KILONGANYA	mkulima	KIANDA	0628250229	S. KILONGA
25	FROLA MATOFALI	mkulima	KIANDA	0710	[illegible]
26	GIDO NYAMU	MKULIMA	KIANDA	0764544237	G.Nyamu
27	WILHEMINA CHOLE	mkulima	KIANDA	— —	[illegible]
28	PATLICK MAGEMBE	mkulima	KIANDA	0613446322	[illegible]
29	EDIMUNDI MAMBE	mkulima	KIANDA	— —	Mambe
30	ANTON MBALAMWEZI	mkulima	KIANDA	— —	[illegible]
31	ANISETH NKAMBI	mkulima	KIANDA	— —	[illegible]
32	MARTIN CHAPANGA	mkulima	KIANDA	— — —	[illegible]
33	ANICETH SAILI	mkulima	KIANDA	— —	A.Saili
34	J SIJOAN	mkulima	KIANDA	—	J.John
35	EFELEMU MATOFALI	MKULIMA	KIANDA	—	E.Matofali
36	J. FANDE	mkulima	KIANDA	—	J. FANDE
37	KATELE WILIAMU	Mkulima	KIANDA		[illegible]
38	ADAMU FERUZI	Mkulima	KIANDA		A FELUZI
39	FRANS MTEMBE	Mkulima	KIANDA		Fmtembe
40	GUSTAV CHOLE	Mkulima	KIANDA		G. CHOLE

Appendix VI: Minutes from MUST staff

MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY

RUKWA CAMPUS COLLEGE

STAFF MEETING WITH A TEAM FROM MAIN CAMPUS ON HEET - ENVIRONMENTAL AND SOCIAL IMPACTS ASSESMENT

DATE	27TH APRIL 2023
VENUE	STAFF CANTEEN
TIME	12:00 AM – 02:00 PM

AGENDA

S/NO	AGENDA	RESPONSIBLE
01	Opening of The Meeting	Principal - MRCC
02	Introduction	Principal - MRCC
03	Presentation on Higher Education For Economic Transformation	Visitors From Main Campus
04	Views from MRCC Staff Members	Staff - MRCC
05	Word of Thanks	Principal - MRCC
06	Closing	Principal - MRCC

ATTENDANCE

S/N	Name	Designation
01	Prof. Osmund Kaunde	Chairperson/Principal
02	Juma Magadulla Shija	Secretary
03	Huruma Selemani	Member
04	Peter Laurian	Member
05	David L. Lutatunda	Member
06	Petronila Makwinya	Member
07	Moses D. Mazengo	Member
08	Mary Yesse	Member
09	Emmanuel Godfrey Lemma	Member
10	Zulfa Juma Hussein	Member
11	Fredrice Maula	Member
12	Osbath Kusiluka	Member
13	Emmanuel Luoga	Member

1

14	Martin P. Kimisha	Member
15	Mwamini O. Salingo	Member
16	Rashid M. Mponda	Member
17	Emmanuel J. Ndunguru	Member
18	Adam C. Mwampunga	Member
19	Charles Y. Mkwiji	Member
20	John Nathan	Member
21	William Tengia	Member
22	Aloyce V. Mbo	Member
23	Naftal A. Mshana	Member
24	Elizabeth J. Elias	Member
25	Gama, Henry	Member
26	Erasto Mwogela	Member
27	Joachim Mwambeleko	Member

ABSENT WITH APOLOGY

1. Dr. Duncan Mwakipesile
2. Jacob Lupia
3. Gallen Mlenge
4. Gasper Chuwa
5. Widson Mwasenga
6. Lazaro Wilson Mwankenja
7. Joseph Matwani

AGENDA 01: OPENING OF THE MEETING.

The Principal opened the meeting at 10:00 am by welcoming all visitors and MRCC Staff members.

AGENDA NO 02: INTRODUCTION.

Principal from MRCC introduced all the visitors from Main Campus

AGENDA NO 03: PRESENTATION ON HIGHER EDUCATION FOR ECONOMIC TRANSFORMATION.

3.1 **INFORMED** that the HEET project was in good progress where the stage to find a consultant for construction works was on progress.

3.2 **INFORMED** that the University in general was given Tshs 73 Billion for the HEET project.

3.3 **INFORMED** that on the HEET project there was a digitization program where the process to connect the Campus with fibre network has started.

3.4 **INFORMED** that the HEET project has offered scholarships to some Academicians especially those from Science and Technology fields like Engineering and ICT.

3.5 **INFORMED** that there were development of curricula enhanced by the HEET project, where the development of curricula was on progress.

3.6 **INFORMED** that teaching and learning materials include books and other materials were included in the project.

3.7 **ADVISED** that during the execution of the project there would be more social interactions, thus staff and all stake holders have been urged to be careful on social and health issues especially on communicable diseases like HIV.

3.8 **INFORMED** that during the project execution people with special needs will be considered by including special infrastructures for them.

3.9 **INFORMED** that the special Department on gender issues has started to solve some gender and other social complaints from members of staff, students and other stake holders.

AGENDA NO 04: RECOMMENDATIONS FROM MEMBERS OF STAFF – MRCC

4.1 **ADVISED** that the project progress was slow, so it was urged that all the stakeholders should put more efforts so that implementstion of construction can can start immediatelyd.

RESPONDED by the presenters that, the project involved many steps including approcval of ESIA documents by the World Bank.

4.2 **REQUESTED** to be acquainted on the HEET beneficiaries because the scholarship beneficiaries were teachers and no other staff.

RESPONDED that the project focuses on priority programmes especially those under science and technology fields. But some short courses will be offered to Management , ICT and Technicians.

4.3 **ASKED** that the gender issues department would be progressive or will cease when the HEET project ends.

RESPONDED that the gender issues department will be sustained even when the HEET project ends.

4.4 **ASKED** that the staff members from MRCC were rarely involved on the HEET process.

RECOMMENDED that the staff members from MRCC to be more involved in the project processes as needs arise especially in providing inputs to the building, equipment and procurement of books.

4.5 **ASKED** that when did the HEET project started and when it would expect to end.

RESPONDED that the HEET project started on the year 2021 and was scheduled for five years.

4.6 **ASKED** that which books were requested from the project, hard copy only or with electronic books.

RESPONDED that all books under HEET project were hard copies and not electronic books, but electronic books were bought by using the institution revenue. Also it was **ADVISED** by the presenter that it was required for the teachers and other stake holders who suggest books to be bought, have to suggest current books which relate to the current technology.

4.8 **ASKED** that the library building will be in the same building or will it be in separate building.

RESPONDED that the Library section will be in the same academic building as well as the Rural Technology Park section.

4.9 **ASKED** on the facilities for preventing communicable diseases when the project would start because there would be more interactions of people.

RESPONDED that the HEET project funds for improvement the MRCC health facilities but the College can request the Management for improvement using internal fund.

4.10 **ASKED** that the HEET project scholarship was for which levels of study.

RESPONDED that HEET scholarships were for Masters and PhD studies and not Diploma nor Undergraduate. Also the short courses should be analyzed by the College, and not all short courses would be done physically, some courses would be done online to reduce some costs to attend say abroad where the technology or equipment bought from.

4.10 **CONCLUSION**: The staff of MRCC unanimously warmly welcomed the HEET project.

AGENDA NO 05. WORD OF THANKS.

The Principal from MRCC thanked all members of Staff and all Visitors for their good participation on the Meeting.

AGENDA NO 06. CLOSURE OF THE MEETING.

The Principal closed the meeting at 2:00 pm.

Approved for issue:

MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY
PRINCIPAL MUST RUKWA CAMPUS COLLEGE (MRCC)
P.O.BOX 424 SUMBAWANGA

Prof. Osmund Kaunde
Chairperson/Principal - MRCC

Juma M. Shija
Secretary - MRCC

MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY

ACTIVITY: STAKEHOLDERS' MEETING STAFF - MRCC

DATE: 27/04/2023

VENUE: CANTEEN (MRCC)

S/N	NAME	DESIGNATION	TEL NO.	EMAIL ADDRESS	SIGN
1	PROF. OSMUND KAUNDE	PRINCIPAL/MRCC	0715528633	osmund.kaunde@must.ac.tz	
2	DAVID L. LUTATUNDA	ASS. NURSE OFFICER	0787248560	davidluge88@gmail.com	
3	HURUMA SELEMANI	LABORATORY TECHNICIAN	0765867736	hurumaselemani95@gmail.com	
4	ENG. PETER LAURIAN	ESTATE OFFICER II	0765-182245	peterlaurian@gmail.com	
5	JUMA SHIJA MAGADULA	EXAM OFFICER	0717219639	shijajuma@gmail.com	
6	Petronila Makwinya	Librarian	0752 204766	pmakwinya@gmail.com	
7	MOSES.D.MAZENGO	PRINCIPAL TECH I	0755536814	mosesmazengo2019@gmail.com	
8	MARY YESSE	LIBRARY ASS.	0743860723	amanuemary@gmail.com	
9	EMANUEL GODFREY LEMA	TUTORIAL ASSISTANT	0782666087	emalema87@gmail.com	
10	ZULFA JUMA HUSSEIN	TUTORIAL ASSISTANT	0628 751006	zulfamaly@gmail.com	
11	FREDRICK MAULA	Technician	0752880336	maulafrederick01@gm.com	
12	OSBATH KWILUKA	DEREVA	0759396034	kwilukaosbath@gmail.com	
13	Emmanuel Ludiga	DEREVA	0769349971	emanuelbeatus@gmail.com	
14	Martin P. Kimisha	ACC	0629429806	martinkimisha@gmail.com	
15	MWAMINI O. SALIMBO	AND	06641116S	Msalimbo@gmail.com	
16	RASHIDI M. MPONDA	L.A	0745 901 304	rasheedy.mponda@gmail.com	
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18	ADAM C. MWAMPUNGA	TCTO	0762079283	adam.mwampunga@must.ac.tz	
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20	JOHN NATHAN	ASAO	0763076324	myunda.john11@gmail.com	

MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY

ACTIVITY: STAKEHOLDERS' MEETING STAFF - MRCC

DATE: 27/04/2023

VENUE: CANTEEN (MRCC)

S/N	NAME	DESIGNATION	TEL NO.	EMAIL ADDRESS	SIGN
21	WILLIAM TENGIA	WARDEN I	0758770046	wtengia@gmail.com	
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23	Nattal A. Mshana	Health Lab. Technol...	0652417499	[illegible]@gmail.com	
24	ELIZABETH J. HIAI	ARTISAN	0755-454058	[illegible]@gmail.com	
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26	ERASTO MWAKATOBE	Technician	0629116122	[illegible]	
27	JOACHIM MWAMBELEKO	Ag HOD MIE	0758000073	joachim.leko@gmail.com	
28	BEATRICE MAKYAO	SOCIAL-COORD.	0768549829	makyaobeatrice@gmail.com	

Appendix VII: Minutes from Service provider

MUHTASARI WA KIKAO CHA USHIRIKISHWAJI KWA AJILI YA MRADI WA HEETE MRCC KILICHO HUSISHA KAMPUNI LA USAFI NA KAMPUNI LA ULINZI.

MAONI

Je ni faida zipi ambazo tutazipata sisi ambao tunafanya kazi za usafi na ulinzi?

majibu

upande wa makampuni ya usafi na ulinzi watu watapata ajira pia kupitia uo mradi utasaidia kama ufuatiliaji wetu utakamilika kila eneo kutakuwa na kamera ambazo zitasaidia upande wa ulinzi pia kutakuwa na ongezeko wa wafanyakazi wa makampuni hivyo watu wataofanya kazi na kupata faida.

Je swala la uharibifu wa mazingira uchangiaji kwa jicho gani? mfano upotevu wa miti kutakuwa na uchimbaji kuzunguka kupata mchanga pia ukataji miti kuzunguka eneo.

majibu

Kutu cha kuanza tutahakikisha miti inayokatwa lazima ipandwe sababu miti pia tunapokata mti lazima tupande miti. pia upande wa mashine sisi kama kamati tumejipanga kutokuwepo kwa hali iyo maana tumejipanga kama ipasavyo.

Mipango ipi uliyojiwekea ili kuongeza wanafunzi

Jibu

Chuo chetu kimejipanga vizuri kwa ajili ya kuongeza wanafunzi hapo masomo ya sayansi ni magumu ila tumejipanga kuajiri walio sawa.

Ufadhili wa masomo unalenga watu wa aina gani

majibu

Ufadhili wa masomo katika chuo chetu unalenga watu wote ambao wanasoma sayansi. pia wafanyakazi wao wanafaa kujiunga na kusoma chuo pia kwa mwanafunzi ali na uwezo kama nyie ni kumpatia msaada.

Ni mipango ipi ambayo ipo kwa ajili ya ulinzi katika kipindi cha utekelezaji?

majibu

Katika chuo chetu mazingira yanapoongezeka vilevile kuongeza fursa za usafi pamoja na ulinzi wanaongezwa wafanyakazi hivyo UO mradi utafaidisha watu wengi katika jamii hii.

Ni mipango ipi iliyopo kwa ajili ya watakao kutoka chuoni.

majibu

tunaomba kuwatoa wasiwasi kuamba serikali ipo kwa ajili ya wananchi wote kwa ajili hiyo kikaoni unatakiwa kuomba na kupata ufaulu mzuri.

USAFI Supervisor

Signature James Gusey

ULINZI

Signature Festo Godfrid Mlongo Mmlongo

Assistant Supervisor

MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY

ACTIVITY: STAKEHOLDERS MEETING SERVICE PROVIDERS MRCC

DATE: 27/04/2023

VENUE: CANTEEN - MRCC

S/N	NAME	DESIGNATION	TEL NO.	EMAIL ADDRESS	SIGN
1.	MG: 483744 Festo G. Mlongo	Assistant Supervisor	0716153424		Amlongo.
~~8.~~	~~James Tuber~~				
2	James Tuber	Supervisor	0625579855		[illegible]
3	Magalina Omma	-Usafi-	0607682734		[illegible]
4	HERty Mwakifuna	uSafi	0747390289		[illegible]
5	ROSE AGELLU	uSafi	0621743035		R.nyellu
6	SPECIOZA ENIGA	[illegible]			S. [illegible]
7.	ELICA NDETRICK	Usafi.	0624177123		E.[illegible]
8	ROSE Bahati	USafi	0698942474		R: Mbo
9.	NEEMA WANGAO	uSafi	0742513969		Ne. W
10.	PETER Kusonguru	USafi	0785449106		P.[illegible]
11	ALEX Senori	usafi	0624045884		[illegible]
12	MEMENS Chambunnsie	usafi	.768829782		[illegible]
13	Taitus GAUDES	uSafi			[illegible]
14	ANGEL AMENI	Usafi	0625569678		A.Amani
15	JOAN MWAKILUMA	SECURITY	0759672322		[illegible]
16	FARAJA KASANGA	UUNZI	0763492650		F.[illegible]
17	Evelina kavugany	ufundi	0757434404		E.[illegible]
18	LETICIA SADALLA	USAFI	0769909735		L.S
19	ESTER FESTO	USAFI	0781993446		EF

MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY

ACTIVITY: STAKEHOLDERS MEETING SERVICE PROVIDERS MRCC

DATE: 27/04/2023

VENUE: CANTEEN - MRCC

S/N	NAME	DESIGNATION	TEL NO.	EMAIL ADDRESS	SIGN
1	Alwbath mwaikambo	USAFI	0623521610		A
2	Danely Mbalamwez	USafi	0768410133		D
3	Daniely Simwelwa	Usafi	0788465112		DJ
4	ANNA MBONDELO	ULINZI	0613643781		A. M
5	AMOSI MWANANZUMI	ulinzi	0718156878		A.
6	Rose John	usafi	0785519 5467		[illegible]
7	Emmanuel ERNEST	USAFI	0782052464		Ernest
8	EMMANUEL MWANDOBWA	USAFI	0627875057		[illegible]
9	LAMECK MAULA	USAFI	0782621808		[illegible]
10	Quarty KATABU	USAFI	–		[illegible]
11	SELEMANI CHAPANGA	ULINZI	067675 2954		[illegible]
12	MARY YAMBAYAMBA	ULINZI	0687277198		M.
13	SARA MGALIGWA	USAFI	0742397408		S. M
14	NEBY TELEMINA	USAFI	0672795386		N.
15	NAOMI ELIAS	USAFI			N.
16	GEORGE UKUNGUWE	ULINZI	0766872693		[illegible]
17	KUSIA Ambakila	usafi	0765800911		KA
18	E. mbafongo	usafi	0962395061		
19	IZIRAEL LINGO	ULINZI	0746359713		[illegible]
20	Hawani Saidi	USAFI	0694453485		[illegible]
21	523197 KAIDIMS	Milly	KiLoS 0756033853		KB

AppendixVIII:Geotechnical Report

MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY

HIGHER EDUCATION FOR ECONOMIC TRANSFORMATION (HEET) PROJECT

GROUND INVESTIGATION REPORT FOR PROPOSED CONSTRUCTION OF:

1. Academic Block
2. Workshops

AT MUST RUKWA CAMPUS COLLEGE

Executive Summary

This report is for the ground investigation performed at MUST Rukwa campus college (MRCC) for the purpose of recommending suitable foundations for academic block and workshop building which have been proposed for construction under the Higher Education for Economic Transformation (HEET) project. These buildings will be constructed at areas located nearby the main entrance gate at MRCC.

The main objective of the task was to undertake a ground investigation of the proposed sites and provide a report which will indicate the adequacy of the site, the ground bearing capacity, and the predicted soil deformation due to loading by the proposed structures. However, due to the limitation of equipment available at the University, a plan was devised to perform insitu testing using the Light Dynamic Probing equipment (DPL) supplemented with trial pits instead of the conventional Standard Penetration Test (SPT) with sampling. In this regard, the deformation properties of the ground could not be determined and are therefore recommended to be performed before construction of the proposed structures.

A total of 17 DPL tests and two (2) trial pits were performed and analysed for the site. The DPL was able to reach a maximum depth of 4.0 m below the ground level and the trial pits were formed to expose the soil and take samples for laboratory testing. Within the tested depth, the site consists of three distinct layers; the top most layers identified to be fill materials (aggregates) which extend to a depth of 0.2 to 0.5 m below the ground level. This layer is followed by a layer of reddish clayey SAND soil that extends to about 1.5 m below the ground level. A layer of brownish silty SAND soil follows and extends beyond the depth where this investigation could reach. During the investigation at the academic block site, ground water was encountered at 1.4 m depth below the ground level.

The DPL results were analysed and converted to equivalent SPT values which were then used to estimate the allowable bearing capacity of the soil at different depths along the soil profile. Additionally, it is recommended to estimate the possible settlement of the soil beneath the proposed buildings before construction and make sure that they are tolerable. The quality of the ground water should also be determined prior to construction. Historical information suggests for the structural design to consider effects of earth quakes.

8.0 Conclusions and Recommendations

A ground investigation was performed for the areas assigned for construction of Academic block and Workshops at MUST Rukwa campus. The methodology of investigation involved insitu testing using the DPL which was supplemented by trial pits. Applying information from desk study, observations, literature and analysis of test results, the following conclusions were drawn:

(i) The proposed construction areas were previously filled with aggregate layer of about 0.2 to 0.5 m thick. The areas are currently not in use and are covered with light vegetation in form of grass.

(ii) About 180 m^2 of the area proposed for academic building is occupied by buried concrete blocks to a depth of 3.0 m

(iii) The MRCC area and neighbouring ground was once flood plain areas and the geology consists of alluvial soils

(iv) Being part of the East African Western Rift System, the MRCC area and Rukwa region as a whole is among earthquake prone areas with experience of high magnitude quakes

(v) The ground profile at the proposed academic block site consists of the top 0.2 m layer of aggregate fill followed by about 0.7 m of Clayey SAND overlying Poorly Graded Silty SAND.

(vi) The ground profile at the proposed workshop building consists of the top 0.2 to 0.5 m thick aggregates fill followed by about 0.7 m of Clayey SAND overlying a Poorly Graded Clayey GRAVEL.

(vii) The allowable bearing capacity of the ground at the academic block area varies from 140 kN/m^2 at 1.0 m depth to 450 kN/m^2 at 3.5 m depth with a layer of loose soil between 1.0 m to 2.0 m.

(viii) The allowable bearing capacity of the ground at the workshop building area varies from 260 kN/m^2 at 0.5 m to 1130 kN/m^2 at 1.5 m depth

(ix) Ground water table is at 1.4 m depth especially at the academic building area

(x) The proposed construction sites are suitable for proposed buildings.

The following recommendations apply for the project:

(i) Avoid placing the academic building over the ground part that has buried concrete blocks in order to avoid the possibility of uneven settlement to the structure

(ii) Structural designs of the proposed buildings should consider occurrence of earthquakes and their effects

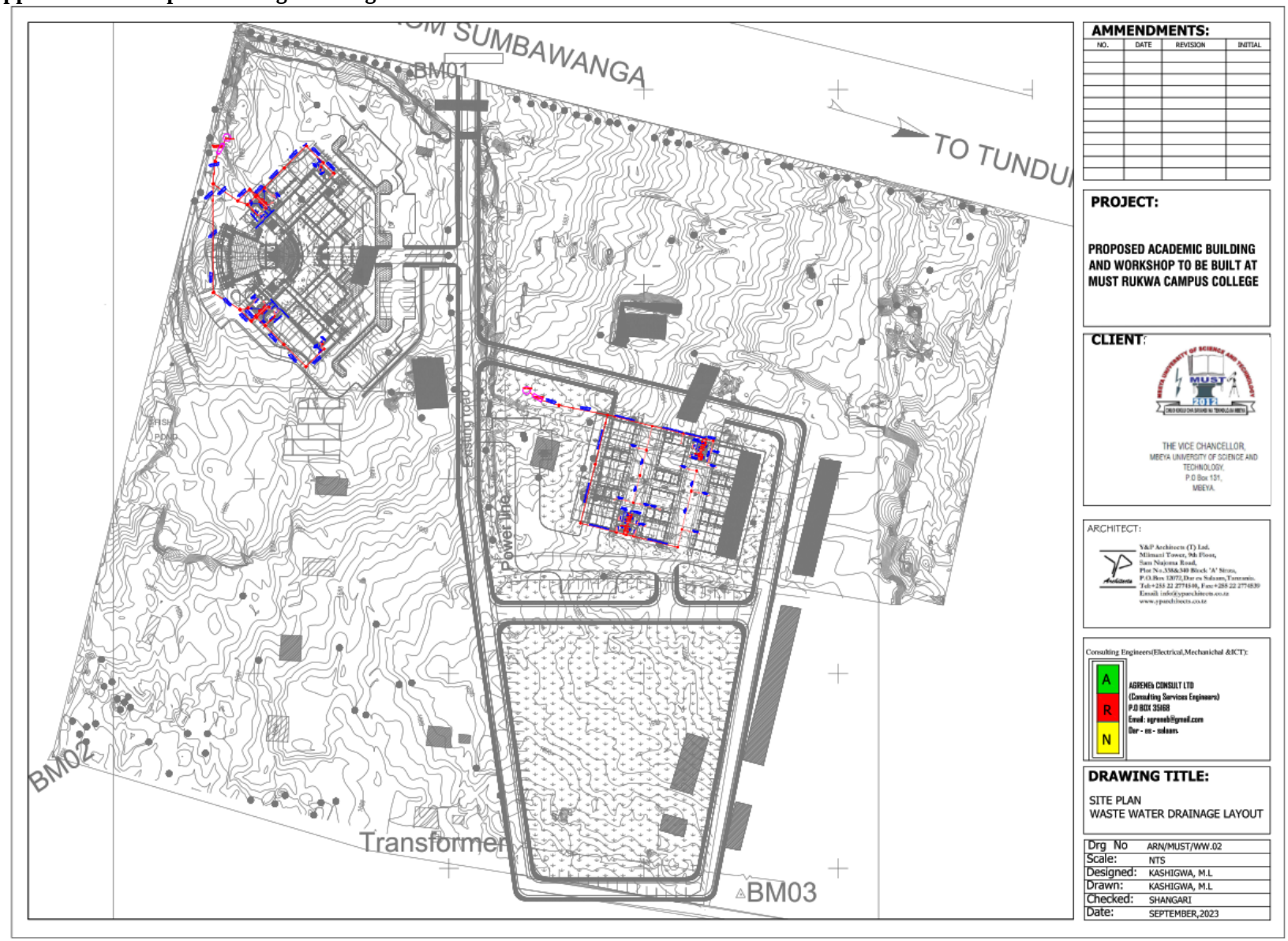
(iii) The proposed academic building should be founded at a depth 2.0 m (allowable bearing capacity 200 kN/m^2) below the existing ground level to avoid the loose/weak soil layer

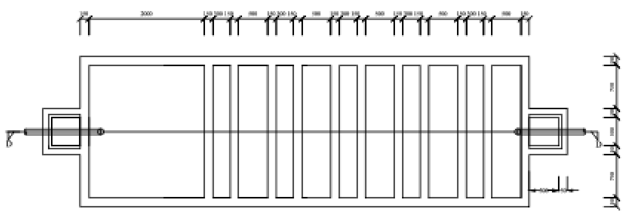
(iv) The workshop building should be founded between 0.5 m to 1.0 m depth (average allowable bearing capacity of 440 kN/m^2)

(v) Drilling, SPT, sampling and laboratory testing should be performed at selected locations prior to construction for the purpose of: determining deformation properties of the soil beneath the proposed footings, predicting settlements and ensuring that they are tolerable and verification of the water table depth.

(vi) Ground water quality tests to be performed prior to construction.

Appendix IX: Sample Working Drawings





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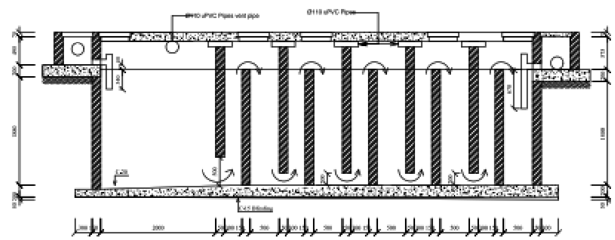
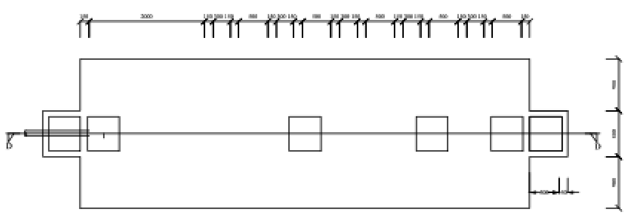
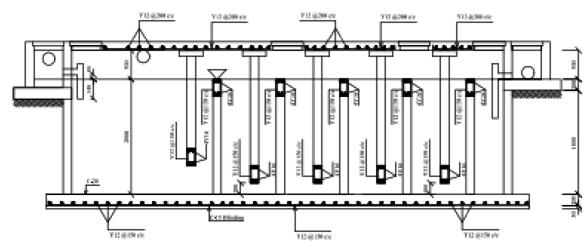


Section A - A



Plan With Cover



Section A - A

ANAEROBIC BAFFLED REACTOR (ABR)

AMMENDMENTS:

NO.	DATE	REVISION	INITIAL

PROJECT:

PROPOSED ACADEMIC BUILDING AND WORKSHOP TO BE BUILT AT MUST RUKWA CAMPUS COLLEGE

CLIENT:

THE VICE CHANCELLOR,
MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY,
P.O Box 131,
MBEYA.

ARCHITECT:

Y&P Architects (T) Ltd.
Mikumi Tower, 9th Floor,
Sam Nujoma Road,
Plot No.338&340 Block 'A' Sinza,
P.O.Box 12071,Dar es Salaam,Tanzania.

Consulting Engineers(Electrical,Mechanichal &ICT):

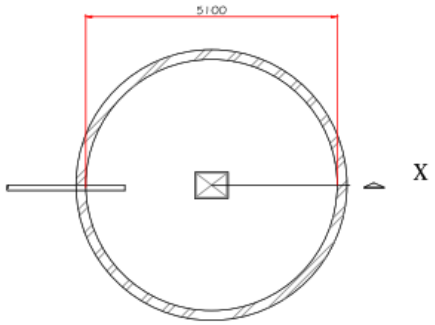
A R N

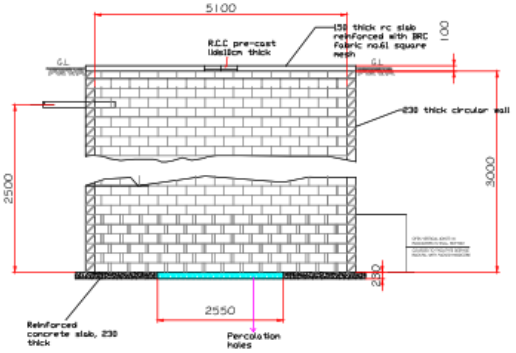
AGRENEb CONSULT LTD
(Consulting Services Engineers)
P.O BOX 35168
Email: agreneb@gmail.com
Dar - es - salaam.

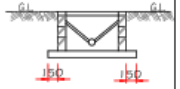
DRAWING TITLE:

ABR CONSTRUCTION DETAILS
WASTE WATER DRAINAGE LAYOUT

Drg No	ARN/MUST/WW.08
Scale:	NTS
Designed:	KASHIGWA, M.L
Drawn:	KASHIGWA, M.L
Checked:	SHANGARI
Date:	SEPTEMBER,2023







SECTION Y - Y

TABLE 2 SOAKAWAY SIZES

Type	All Wastes No Of Uses	Soil wastes no of users	Diameter of soakaway (meters) (M) percolation factors					
			1.5	3.5	6.5	10	15	20
1		10						
2	7	20	2.80	3.10	3.50	3.80	4.40	4.80
3	15	30						
4	30	45	3.10	3.70	4.30	4.80	5.30	5.70
5	40	60						
6	50	75	3.40	4.10	4.70	5.30	6.00	6.30
7	60	90						
8	75	105	3.70	4.40	5.10	5.70	6.30	6.70
9	85	120						

AMMENDMENTS:

NO.	DATE	REVISION	INITIAL

PROJECT:

PROPOSED ACADEMIC BUILDING AND WORKSHOP TO BE BUILT AT MUST RUKWA CAMPUS COLLEGE

CLIENT:

THE VICE CHANCELLOR,
MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY,
P.O Box 131,
MBEYA

ARCHITECT:

Y&F Architects (T) Ltd.
Mkinani Tower, 9th Floor,
Sam Nujoma Road,
Plot No.338&340 Block 'A' Skeza,
P.O.Box 32892,Dar es Salaam,Tanzania.
Tel:+255 22 2774040, Fax:+255 22 2774539
Email: info@yparchitects.co.tz
www.yparchitects.co.tz

Consulting Engineers(Electrical,Mechanical &ICT):

A R N

AGRENEb CONSULT LTD
(Consulting Services Engineers)
P.O BOX 35168
Email: agreneb@gmail.com
Dar - es - salaam.

DRAWING TITLE:

SOAKPIT CONSTRUCTION DETAILS
WASTE WATER DRAINAGE LAYOUT

Drg No	ARN/MUST/WW.09
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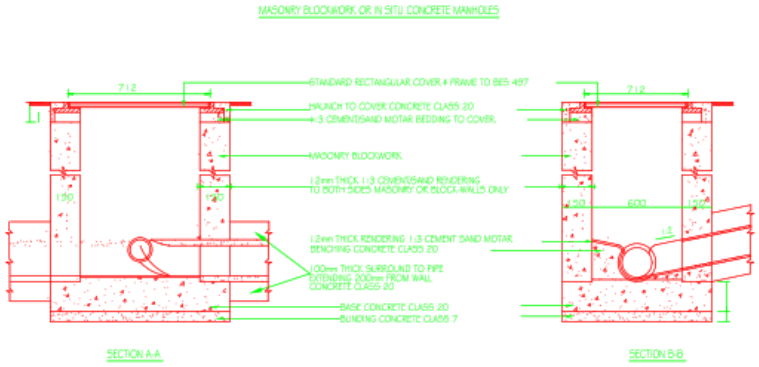
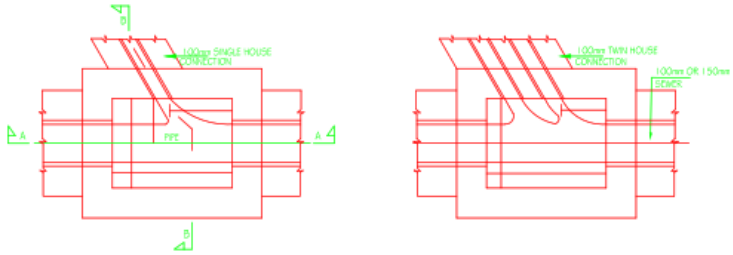
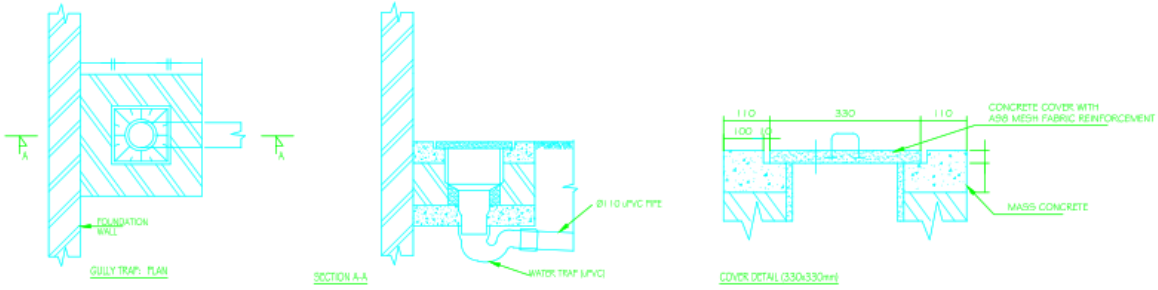
Drawn:	KASHIGWA, M.L
Checked:	SHANGARI
Date:	SEPTEMBER,2023







AMMENDMENTS:

NO.	DATE	REVISION	INITIAL

PROJECT:

PROPOSED ACADEMIC BUILDING AND WORKSHOP TO BE BUILT AT MUST RUKWA CAMPUS COLLEGE

CLIENT:

THE VICE CHANCELLOR,
MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY,
P.O Box 131,
MBEYA

ARCHITECT:

Consulting Engineers(Electrical,Mechanical &ICT):

AGRENEb CONSULT LTD
(Consulting Services Engineers)
P.O BOX 35168
Email: agreneb@gmail.com
Dar - es - salaam.

DRAWING TITLE:

GULLY TRAP & MANHOLE DETAILS
WASTE WATER DRAINAGE LAYOUT

Drg No	ARN/MUST/WW.10
Scale:	NTS
Designed:	KASHIGWA, M.L
Drawn:	KASHIGWA, M.L
Checked:	SHANGARI
Date:	SEPTEMBER,2023

Appendix X: Terms of References submitted to NEMC

ENVIRONMENTAL IMPACT ASSESSMENT OF THE PROPOSED CONSTRUCTION OF TWO ACADEMIC BLOCKS, TWO WORKSHOPS AND INNOVATION HUB TO BE BUILT AT MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY LOCATED AT BLOCK FF, PLOT NO. 1 IN MBEYA CITY, MBEYA REGION, TANZANIA

TERMS OF REFERENCES

SUBMITTED TO:

NATIONAL ENVIRONMENT MANAGEMENT COUNCIL (NEMC),
Southern Highlands Zone,
P. O. BOX 6215,
Mbeya.
Email: *mbeyanemc@gmail.com*
Website: *www.nemc.or.tz*

PROPONENT:

Vice Chancellor,
MUST,
P. O. Box 131,
Mbeya.
+255 25 250 3016
must@mustnet.ac.tz

October 2021

1

Table of Contents

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR THE PROPOSED CONSTRUCTION OF TWO ACADEMIC BLOCKS, TWO WORKSHOPS AND INNOVATION HUB TO BE BUILT AT MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY LOCATED AT BLOCK FF, PLOT NO. 1 IN MBEYA CITY, MBEYA REGION, TANZANIA

1. INTRODUCTION

The detailed scope for undertaking Environmental and Social Impact Assessment is intended to guide the Consultant to address relevant environmental and social issues during the assessment process. Among others, the ESIA shall be conducted in accordance with the requirements of the Environmental Management Act (2004). The Consultant shall do everything necessary to meet the objectives of the services and not less than the following task that should be undertaken during the Environmental and Social Impact Assessment. In the process of consultation with relevant stakeholders like environmental authorities, the Consultant may further be required to finalize the TOR according the agreement with these stakeholders.

2. SCOPE OF WORK

Task 1: Description of the Proposed Project

The Consultant shall provide a brief description of the relevant parts of the project using maps of appropriate scale where necessary and include the following information:-

- Project justification;
- Location;
- General layout, size, and capacity;
- Area of influence of the road works
- Pre-construction activities
- Construction activities
- Schedule of project activities
- Staffing and support;

- Facilities and services
- Operation and maintenance activities
- Life span

Task 2: Description of the Environment

Collect, evaluate, and present baseline data on the relevant environmental characteristics of the study area. Include information on any changes expected before the project begins. All the critical information pertaining to the aspects mentioned below shall be clearly described after a detailed assessment.

(a) Physical environmental: This shall cover geology; topography; soils; climate and meteorology; physical structures at site, utilities and services available.

(b) Biological environment: All flora and fauna present at the project site (if any).

(c) Socio-cultural environmental: population, land use; planned development activities community structure; goods and services; recreation; public health; Gender issues and HIV/AIDS, Cultural/ historic properties and attitudes to the project.

Task 3: Legislative, Policies, Administration Framework

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, The Consultant shall undertake a review of policies, legislation and administrative framework within which the environmental management of the proposed construction of the proposed buildings will be carried out. The following and any other relevant legislation and policies shall be reviewed:-

- Environmental Management Act No. 20 of (2004), Cap. 191

- The Water Supply and Sanitation Act No. 12 of 2009
- The Urban Planning Act (2007)
- Land Use Planning Act (2007)
- Occupation Health Safety (2003)
- Mining Act (1998)
- Employment and Labour Relations Act No. 6 0f 2004
- Engineers Registration Act and its Amendments 1997 and 2007
- The Contractors Registration Act (1997)
- The Architects and Quantity Surveyors Act (1997)
- The HIV and AIDS (Prevention and Control) Act of 2008
- The Local Government Laws (Miscellaneous Amendments) Act (1999)
- The Tanzania 2025 Development Vision
- Environmental Impact Assessment and Auditing Regulations (2005)

Task 4: Assist in Interagency Coordination and Public Participation

Assist in coordinating the ESIA with the key stakeholders, in obtaining the views of affected groups, and in keeping records of meetings and other activities, communications, and comments and their disposition. Establish the views of the public with regards to the potential impacts of the proposed construction of proposed project. Identify the different groups of stakeholders, and then use the most appropriate method to establish their views. Particular attention shall be paid to the local community where different age groups will be considered in make consultation as well as any category of stakeholders which may be affected by the proposed project.

The Consultant shall undertake an open and transparent consultation process to ensure that the views of interested and affected parties are and approximately incorporated in the project design.

Task 5: Analysis of Alternatives to the Proposed Project

Describe alternatives that were examined in the course of developing the proposed project and identify other alternatives, which would achieve the same objectives. The concept of alternatives covers the following aspects: siting, design, technology selection, construction techniques and phasing, and operating and maintenance procedures. Compare alternatives in terms of potential environmental and social impacts; capital and operating costs; suitability under local conditions; and institutional, training, and monitoring requirements. When describing the impacts, indicate which are irreversible or unavoidable and which can be mitigated. The analysis will alsoinclude the alternative of not constructing the project to demonstrate environmental and social conditions without the project.

Task 6: Identification, Analysis and Assessment of Potential Impacts

The Consultant shall identify, analyse and assess environmental and social impacts of the proposed project. The Consultant shall distinguish between positive and negative impacts, direct and indirect impacts, and immediate and long-term impacts. Identify impacts that are unavoidable or irreversible.

Among other things, the study shall take note of the following:

- Number of storey of the proposed buildings.
- Layout of the proposed site
- Append the approved architectural and structural designs of the proposed buildings
- Provide geological information of the project site

The assessment shall also focus on the potential for negative environmental and social impacts caused by Air and noise pollution; The significance of impacts of the proposed construction of the proposed project shall be assessed, and the basis of this assessment shall be specified. The Consultant shall take

into consideration existing by-laws, national and international environmental standards, legislation, treaties, and conventions that may affect the significance of identified impacts.

Task 7: Mitigation Measures

The Consultant shall suggest cost-effective measures for minimizing or eliminating adverse impacts of the proposed construction and operation of the proposed project.

The consultant shall also provide mechanisms of managing wastewater and solid waste generated during construction and operation phases. The costs of implementing these measures shall wherever possible be estimated and presented. If compensation is recommended as one form of mitigation, the Consultant shall identify all the names and physical addresses of people to be compensated.

Task 8: Environmental and Social Management Plan (EMP)

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

Identify institutional needs to implement environmental assessment recommendations. Review the authority and capability of institutions at local, regional, and national levels and recommend how to strengthen the capacity to implement the environmental and social management and monitoring plans. Prepare detailed arrangements to monitor the implementations of mitigating measures and the impacts of the project during construction and operation. Include in the plan an estimate of capital and operating costs and a description of other required inputs.

3. REPORTING

The Environmental impact Statement shall be brief and limited to significant environmental Issues. The report shall focus mainly on findings, conclusions, and recommended actions supported by summaries of the data collected and citations for any references used in interpreting data. The ESIA report shall be organised according to the outline in the Environmental Impact Assessment and Audit Regulations (2005). It will contain separate Executive Summaries both in English and Swahili. All reports shall be submitted initially as draft versions, which shall be finalized to accommodate clients' comments.

4. STAFFING

To ensure effective and efficient performance of the task the consultant will involve other supporting staff with varied expertise and experience.