

**MWALIMU JULIUS K. NYERERE UNIVERSITY OF AGRICULTURE AND  
TECHNOLOGY**



**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT FOR THE  
PROPOSED ESTABLISHMENT OF THE MWALIMU JULIUS K. NYERERE UNIVERSITY  
OF AGRICULTURE AND TECHNOLOGY MAIN CAMPUS ON PLOT NO.1 BLOCK F  
BUTIAMA TOWNSHIP, MARA REGION**

**PROPONENT**

**MWALIMU JULIUS K. NYERERE UNIVERSITY OF AGRICULTURAL AND  
TECHNOLOGY**

**P.O BOX 976 MUSOMA**

**EMAIL [info@mjnuat.ac.tz](mailto:info@mjnuat.ac.tz)**

**+255 282985750**

**WEBSITE [www.mjnuat.ac.tz](http://www.mjnuat.ac.tz)**

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## **EXECUTIVE SUMMARY**

### **INTRODUCTION**

Mwalimu Julius K. Nyerere University of Agriculture and Technology (MJNUAT) is one of the beneficiary institutions from the Higher Education for Economic Transformation (HEET) Project. HEET Project is funded by the World Bank through the Ministry of Education, Science and Technology (MoEST). The project lifespan is five-years from September 2021 up to September 2026. HEET Project will invest in requisite infrastructure for modern and effective teaching and learning environment, research and training staff to the highest standard needed by the universities.

As a prerequisite to the construction of new buildings, the project will involve various site excavation activities including the demolition of the existing dilapidated buildings currently on site. Construction of buildings and associated activities will inevitably have adverse environmental, social and economic impacts. These impacts need to be identified, predicted and evaluated so that positive impacts are enhanced while mitigation measures are developed for negative impacts. The Environmental Management Act of 2004 of Tanzania requires project developers to carry out an Environmental and Social Impact assessment (ESIA) prior to project implementation. In accordance with the categories identified in the Third Schedule to Environmental Management Act, Cap 191 and First Schedule to Environmental Impact Assessment and Audit (Amendment) Regulations, 2018, the nature of this project is subject to full EIA study.

Similarly, the World Bank provides Environmental and Social Framework (ESF), Environmental and Social Safeguarding Policies and relevant Environmental and Social Standards (ESSs), which aim to offset the anticipated social and environmental impacts, including the Investment Projects Financing. The ESS1 sets out the requirements for Borrowers relating to the identification and assessment of environmental and social risks and impacts and development of mitigation measures.

In fulfillment of national and international requirement, MJNUAT prepared ESIA application documents, which included Scoping Report and Terms of Reference (TOR). As a legal procedure, the documents were submitted to NEMC as part of project registration and allotted Project Reference No. EC/EIA/2022/9073. Terms of Reference (ToR) was approved by NEMC and communicated through a letter of 28/10/2022 with Reference Number HE.145/88/81/01 (Appendix 1). The approved ToR provided guidance under which the environmental and social assessment was done. The 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) requirement complied in the study. In addition, this ESIA has been guided by the Project Appraisal Document (PAD) and Project Operational Manual (POM) both of 2021.

## **PROJECT DESCRIPTION**

The project will involve construction of a College of Agriculture, School of Agricultural and Bioprocess Engineering and Technology and; School of Energy and Mining Engineering and Technology. Other buildings to be constructed will include administration block, halls of residents for students, cafeteria, laboratories, workshops and external infrastructure including roads, paved ways, and landscaping and recreational facilities. Total budget for the project is USD 36,5 Million equivalent to Tsh. 83,950,000. A major part of the budget (about 70%) will be spent in construction of the learning infrastructure. MJNUAT was granted Certificate of Land Occupancy No. 105 MRLR dated 24 October 2019 a Building Permit Number BDC/BP/2022/15-24. The construction period is estimated to be 18 months starting from December 2023. HEET Project will employ a total of 1005 workers comprising of 330 skilled and 675 unskilled laborers at different phases of the project implementation. Upon completion the project will enroll a total number of 6,500 students and about 1,000 staff members including academic, technical and administration.

## **PROJECT LOCATION**

The proposed project will be established in an area of 231.915 hectares, Plot No. 1 Block F in Butiama District, Mara Region at the former Butiama Artificial Insemination Centre (BAIC) it is located 3km from Butiama Township along the Musoma-Arusha Highway. The proposed project is bordered by a tarmac road to the South, private farms to the West, Rwamkoma road to the East and Rwamkoma Primary School to the North.

## **PROJECT MAIN ACTIVITIES**

The development of the proposed project will involve various phases, including the mobilization, construction, operation and decommissioning.

***Under Mobilization*** phase activities will involve site clearance, recruitment of workers where the proponent and the contractor will ensure that they employ experts in environment, social; and occupational health and safety for the project. They will also recruit other workers for various duties and responsibilities of the project. Furthermore, the contractor will ensure that all necessary permits for construction are in place. Necessary safety measures will be put in place by the contractor, he/she will establish

a temporary site office for construction activities. The office will also include material store and pit latrines for male and females. The project will employ various types of equipment and machinery including Excavator, Wheel loader, Trucks, Motor grader, and concrete mixers.

***During the construction*** phase activities will include excavation, vegetation clearance, heavy and light machines will be collected at the project site. The Contractor will also employ more skilled and unskilled workers. Skilled labor will include engineers, technicians, foremen, etc. The Contractor will comply with the Employment and Labor Relation Act No. 6 of 2004. The contractor will also comply with the Labor Institution Wage Order (2013) by paying salaries/wages as per guiding labor laws. Overall the Contractor shall apply all relevant laws as guided by the Contractor Registration Board (CRB); Engineers Registration Board (ERB) and Architect and Quantity Survey Registration Board (AQRB) as well as NEMC (EMA 2004, Environmental Impact Assessment and Audit 2015 with its amendment of 2018 and World Bank requirement (ESF, ESMF) as well as other relevant international laws on construction, safety and climate change e.g. the United Nations Framework Convention on Climate Change (1992).

***Operation and Maintenance Phase.*** This phase will involve the actual implementation of the project through students' enrolment in STEM, Lecturers trained high degrees in STEM, programme running through face to face and e-learning.

**Decommission phase** is a phasing out of the project. For this project it could imply major rehabilitation and remodeling and layoff of workers. The activity will generate of both solid and liquid waste which will demand proper management plan.

## **POLICY AND LEGAL FRAMEWORK**

Tanzania is committed to attaining sustainable development goal. Some of the Acts, policies and legislation that have a close bearing to this project are listed hereunder:

- i. Environmental Management Act No. 20 of (2004), Cap. 191
- ii. The Water Supply and Sanitation Act No. 12 of 2009
- iii. Land Act no 4 (1999)
- iv. The Urban Planning Act (2007)
- v. Occupation Health Safety (2003)
- vi. Employment and Labour Relations Act No. 6 of 2004
- vii. Engineers Registration Act and its Amendments 1997 and 2007

- viii. The Contractors Registration Act (1997)
- ix. The Architects and Quantity Surveyors Act (1997)
- x. The HIV and AIDS (Prevention and Control) Act of 2008
- xi. The Local Government Laws (Miscellaneous Amendments) Act (1999)
- xii. The Tanzania 2025 Development Vision
- xiii. Environmental Impact Assessment and Auditing (amendment) Regulations (2018)
- xiv. The National Health Policy of 2008; xiv The Tanzania 2025 Development Vision;
- xv. The Employment and Labour Relations Act No. 6 of 2004;
- xvi. The Graves Removal Act (No 9) of 1969

Similarly, this ESIA study has complied with the World Bank Environmental and Social Framework which supports green, resilient, and inclusive development by strengthening protection for people and the environment and making important advances in areas such as labor, inclusion and non-discrimination, gender, climate change, biodiversity, community health and safety, and stakeholders' engagement.

- World Bank's new Environmental and Social Framework (ESF);
- The World Bank Environmental and Social Safeguarding Policy for Investment;
- WB relevant Environmental and Social Standards. HEET will apply 5 relevant standards out of 10 Environmental and Social Standards (ESSs), which are:
- ESS1- Assessment and Management of Environmental and Social Risks and Impacts;
- ESS2 - Labor and Working Conditions;
- ESS3 - Resource Efficiency and Pollution Prevention and Management;
- ESS4 - Community Health and Safety
- ESS5 - Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
- ESS8- Cultural Heritage; and
- ESS10 - Stakeholder Engagement and Information Disclosure.

The ESIA further incorporated requirement by the Environment and Social Commitment Plan (ESCP).

Further, it complied relevant International Agreements, Conventions and Treaties include:

- I. United Nations Framework Convention on Climate Change (1992)
- II. Relevant International Labor Organization (ILO) Conventions ratified by
- III. Tanzania
- IV. C138 Minimum Age Convention of 1973;
- V. C182 Worst Forms of Child Labor Convention of 1999;
- VI. C148 Working Environment (Air Pollution, Noise and Vibration) Convention of 1977

Overall, this ESIA intends to minimize or eliminate the adverse impacts by identifying predicting and evaluating significant impacts, developing enhancement/mitigation measures and closely monitoring the performance of the proposed mitigations and unforeseen impacts.

## **BASELINE CONDITIONS**

Primary environmental data analysis involved air quality, noise, vibrations and dust pollution were samples from different locations, analysed and presented in Chapter 4. Results showed all parameters to have complied with the existing Tanzania Bureau of Standards (TBS) and WHO (2011) Guidelines. Water quality was analysed from the samples within the project area and neighboring communities. The samples were taken from boreholes, shallow wells and Kiarano dam. Results showed color, turbidity, chemical and biological (Total coliform) were all above TBS and WHO (2011) Guidelines. The remained parameters complied with TZS789 (2018) and these were Sodium, Potassium, Total Hardness, Calcium, Magnesium, Chloride, Fluoride, Sulphate, Nitrate, Nitrite, Iron, Manganese Ammonia, Arsenic, Barium, Boron, Aluminium, Chromium, Cadmium, Lead, Zinc, Selenium, Copper, Nickel, Lithium, Silver and Bathmats.

Socio-economic data collection involved a sample of 86 households selected randomly in villages surrounding the project area. The sample was 20% of the total households in the location. The study intended to establish baseline data on socio-economic activities and access to social services. Results showed that main activities were farming, livestock keeping, petty trade activities, transportation and office works. The study also revealed access to social services was not adequate. It is expected that the proposed project will increase the population in the area, which will stimulate more socio-economic activities within the surrounding villages. However, the influx of people may have adverse impacts on security, health, cultural change and access to social services.

## **STAKEHOLDER CONSULTATIONS AND PUBLIC INVOLVEMENT**

Stakeholders' identification and engagement process was conducted based on EIA and Audit Regulations, 2005 and its amendment of 2018 and World Bank Environmental and Social Standards (ESS10), WB Prepare and disclose Stakeholders Engagement Plan (SEP) and Resettlement Action Plan (RAP) and UNDP (2002) EIA Training Manual Resource.

Public consultation entailed sharing information and knowledge about the project, seeking to understand key stakeholders' concerns and building relationships with the community.

Identification of key stakeholders was based on the role, relevance and influence of an organization; group or individual has on the proposed project. It was based also on how

he/she will be affected by the project

The Stakeholders Engagement Plan (SEP) was developed. It covered a wide range of stakeholders both national and sub-national focusing mainly on regional, district and surrounding villages. The project involved various stakeholders with a concept of inclusiveness by involving women, vulnerable people as well as people with special needs. The purpose of consultation was to get their views throughout the project lifespan. In addition, a mechanism was put in place to address grievances; Gender based Violence (GBV), Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH).

Stakeholders' identification considered all aspects of stakeholders that may be affected or have interest with project activities whether positively or negatively and/or based on their roles in implementation of the project. The main stakeholders consulted included Butiama District Council; Fire and Rescue Force; TANESCO, MJNUAT, TRA, MUWASA, RUWASA and Mgango-Kiabakari Water Project, Ward and village Leaders; Occupational Safety and Health Authority, and villagers through meetings.

Consultations with stakeholders revealed that the proposed project will have positive impacts on their livelihood. It will stimulate new economic and social development opportunities in Butiama District, Musoma Town and Mara region in general. Nevertheless, stakeholders also raised a number of issues and concerns on how they will benefit from the upcoming employment opportunities, how they will be protected from noise, dust, air pollution, child labor, violation against gender and people with special needs. Also, stakeholders' indicated concern on pressure on social services (water, schools, and health facilities), which are currently not adequate and the coming of the project may further worsen the situation. In addition, accommodation facilities for staff and students will be a challenge as the project will only provide 20% accommodation for 6500 students. Stakeholders were encouraged to invest in such opportunities for their economic gain.

## **ENVIRONMENTAL AND SOCIAL MANAGEMENT OF SIGNIFICANT IMPACTS**

ESMP development for the evaluated significant impacts followed procedures set by the Environmental Impact Assessment and Audit (Amendment) Regulations 2018 and as indicated in the ESIA Terms of Reference. Further World Bank Environment and Social Framework (ESF) and the project's Environmental and Social Management Framework (ESMF) were observed in the study. Significant impacts and measures to enhance positive and mitigate negative impacts are summarized below.

### **SIGNIFICANT IMPACTS AND MITIGATION MEASURES MOBILIZATION PHASE**

#### **Enhancement of positive socio-economic impacts**

##### **1. Job Creation**

- One of the strategies to enhance positive impacts is to create active strategy for achieving meaningful employment to the local communities. These may include;
- Involving local authorities, underprivileged and policy makers
- Provide priority of employment to local, unemployed yet willing to work hard.
- Employment should be on equal opportunities for all
- Provide on-job training
- Encourage saving for workers in that the livelihood could be sustained even after job termination

#### Mitigation measures of negative social impacts

##### 2. Solid waste generation

- Hazardous materials to be removed in accordance with EMA 2004, ESMF and
- Reuse as initial filling materials where leveling of runway, taxiway and apron is required
- The Contractor to prepare a Waste Management Plan for solid, liquid and hazardous waste
- The Contractor to prepare a detailed Demolition Plan and Construction Management Plan to the satisfaction of the proponent and relevant Authorities prior to the commencement of works on site
- Contractor to encourage the principle of 3R's to his workers
- Materials that cannot be reused shall be sent to a the authorized dumpsite or dealers.  
ESCP
- A hazardous materials inspection to be undertaken by an accredited consultant

##### 3. Risk of communicable diseases transmission e.g HIV/AIDS

- Prepare and implement prevention and Contingency Plan for diseases outbreak
- Practice awareness raising on the dangers of the HIV/AIDS within the project premises especially to those who are vulnerable
- Institute mechanisms to support people living with HIV/AIDS.
- Developer to establish its own health facilities
- Provide First Aid Kit
- Provide support for workers living with HIV/AIDS
- Provide Voluntary Counseling and Testing (VCT) facility and regulations
- Comply with HIV/AIDS laws

Comply with ESCP

### **CONSTRUCTION PHASE MITIGATION MEASURES FOR SOCIAL POSITIVE IMPACTS**

4. Jobs creation: As explained in S/N 1 Above

5. Income to Local Suppliers and Service Providers



- Sensitize on good quality products and services
- Provide fair market based prices for farm and non farm goods.
- Provide appropriate space for service providers

#### 6.Impact on Skills

- Contractor shall provide on job skills and training

### **NEGATIVE SOCIO-ECONOMIC IMPACTS**

#### 7.Occupational Safety and Health Impacts

- The Contractor to have a qualified health and safety officer onsite during construction phase,
- Comply with OSHA, ESCP requirements
- Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones.
- Using a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels
- Provide and wear appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes
- Train staff in emergency planning and management;
- Developing a detailed health and safety plan and training all contractor staff on the plan.

#### 8.Gender Based Violence

Contractor should have a clear policies on sexual harassment and verify that workers know and respect codes of conduct

Ensure the availability of effective grievance redress mechanism that minimize the reporting burden on victims

Prepare and implement Prevention and Contingency Plan for diseases outbreak, SEA; SH/GBV

Avoid exclusion and discrimination of vulnerable individuals

## 9. Gender Discrimination

- All people shall be employed as per Tanzania employment laws and regulations as well as ILO relevant and ratified laws
- Any form of discrimination shall be prohibited at the project site
- Support more women in senior roles and responsibilities
- Implement gender neutral recruitment process
- Provide training on unconscious biasness
- Have a clear policy on Gender inclusiveness and mainstreaming

## 10. Child Labor

- Abide to the legal framework for Child Labor the Law of the Child Act (Act No. 21, 2009), which sets the minimum age for admission of a child to employment at 14 (Sec. 77.2).
- Permit light work for children who are at least 12 for 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).
- Create awareness to the communities on the importance of education to their children
- Government to increase more education facilities and tutors.
- Local authorities should develop bylaws to control the engagement of children in petty business or work in project related activities

## 11. Conflict due to influx

- After satisfaction with recruitments, put signage like "No employment at the moment", to keep away job seekers.
- Local workers will be hired to the extent possible to minimise influx
- Workers will be required to sign worker codes of conduct
- Strengthen security and policing systems

## **MITIGATION MEASURES FOR NEGATIVE ENVIRONMENTAL IMPACTS**

### 12. Impacts on air quality

- Institute regular maintenance of equipment
- Enforce vehicle road restrictions to avoid excess emissions from engine overloading, where practical switching off engines will be done when not in use;
- Practice routine inspection of equipment;
- Trucks transporting materials shall be fully covered

- Turn off engines to reduce idling.
- Protect stockpiles of friable material subject to wind through wetting;
- Cover loads with of friable material during transportation;
- Douse with water of roadways and work sites to reduce dust when necessary

### 13.Impacts on noise and vibrations

- Restrict vehicles carrying construction materials to work during day times only  
Machine operators in various sections with significant noise levels shall be provided with noise protective gear; and
- Construction equipment shall be selected, operated and maintained to minimize noise.
- Impact pile driving shall be avoided where possible in vibration sensitive areas; and
- Vibratory rollers and packers shall be avoided.
- Comply with OSHA requirements

### 14.Wastewater management problems

- Wastewater shall be properly treated in the Septic Tank Before disposal into the Soak Away Pit within the site and then link to the Up-flow Anaerobic Sludge Blanket (UASB).
- The effluent from UASB can be used for irrigation purposes in demo farms or gardens considering that there will be agriculture programs.
- Contractor shall be instructed to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste; and
- Training on waste management shall be done to all personnel, operators and services providers.

### 15.Solid waste generation

- Contractor shall be instructed to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste; and
- Train waste management to all personnel, operators and services providers.
- Designated area for wastes collection.
- Provide wastes receptacles and labeling.
- Only authorised waste collection agency at Butiama/Musoma will be engaged for collection of the waste.
- Encourage application of 3R's waste management
- Sort waste and provide waster bins accordingly
- Comply with OSHA and ESCP guidelines

### 16.Erosion of Exposed Surfaces

- which a maximum requirement of compaction strength is achieved during the construction. That is maximum dry density (MDD) specified in the design manual by consultant;
- Maintain gravel fill and/or re-vegetate around the structures;
- Unnecessary ground clearance and sensitive re-alignments shall be avoided;
- Directing flow to properly designated channels;
- All excavation works shall be properly backfilled and compacted; and
- Concentrate construction activities in designated areas
- Undertake construction as per engineering design and procedure of

#### 17.Landscape and visual impacts

- 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.
- Institute landscape engineering, tree planting and ground modeling.
- Practice efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted

#### 18.Loss of vegetation

- Clearance of patches of native forest remaining in the neighborhood of the proposed project shall be avoided
- Close supervision of earthworks shall be observed in order to confine land clearance within the project site
- Give uprooted trees to the residents through ward/streets governments or any other arrangement may seem convenient provided he does not contravene the Forest Acts 2002.
- Designed and implemented appropriate landscaping programme

#### 18.Increased Pressure on Social Services and Utilities

- Use of water conservatively by instituting appropriate technologies (e.g. self-lock water tape) and awareness raising notices to users, etc.
- Construct underground water reserve tank and introduce rainwater harvest systems.
- Apply 3R's water recycling, reuse or reduce amount of consumption.
- Build more primary and secondary schools
- Provide/strengthen health facilities and infrastructure as well as human resources.
- Developer to construct its own health facility
- Provide Health Insurance for all

#### 19.Water Pollution

- Use efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at project areas;
- Provide waste disposal bins and warning notices, posted at strategic points;
- On site burial or open burning of solid waste shall not be permitted.
- Wastes not suitable for incinerations and general municipal waste dumping (e.g., Batteries, plastics, rubbers, tires, etc.) shall be removed for recycling, treatment, and/or disposal by licensed contractor as appropriate.

#### 20. Storm water generation and overflow

- The design storm water drainage will be given a high priority, with the limitation of gradient (slope) required for the runway, taxiway and apron.
- Proper hydrology analysis will be carried out, considering the topographical features, amount of rainfall and catchments area as the major factors of design of storm water channel. Channel with the capacity of accommodating the amount of water found will be provided/designed.
- Rainwater harvesting will be used at the MJNUAT campus
- The design shall consider enough greeneries in the project site

#### 21. Health and Safety Risks Due to Fire Hazards

- Adequate number of portable fire extinguishers shall be placed at strategic locations.
- Good housekeeping shall be maintained at all sites to reduce the fire risk.
- The design of the buildings shall strictly adhere to the Fire Safety Standards
- Fire detectors and sprinkler system shall be installed in buildings

#### 22. Traffic accidents

- Institute speed limit
- Provide protective gars
- Provide first aid kits
- Provide safety education to workers
- Provide danger signs/billboards in the project area

### **SIGNIFICANT IMPACTS DURING OPERATION PHASE**

Enhancement of social positive impacts

#### 23. Production of experts in STEM

- Encourage pupils in secondary schools to pursue STEM related subjects
- Encourage surrounding communities to take to school their children and later join the university in the locality, which will be cheaper.
- Support more lecturers to pursue STEM related degrees.

- Establish more e-learning STEM related programmes

#### 24. Job Creation

Refer explanation provided in S/N 1 above

#### 25. Increased extension services

- Practice routine visit to farmers surrounding the university
- Conduct short courses for farmers and livestock keepers
- Introduce help desk for farmers and livestock keepers
- Conduct research that respond to real world problems.

#### 26. Increased market access to farm and non farm production

- Enhance agronomic practices for high productin
- Build capacity on high quality product and services
- Build capacity on value addion and processing
- Provide market based prices

### **SIGNIFICANT NEGATIVE SOCIAL IMPACTS**

#### 27. Risk of security decrease

- Establish Auxiliary Police in the campus
- OCD to enhance security services in the campus
- Install CCTV camera in the campus

#### 28. Cultural heritage and norms degradation

- Educate on the importance of maintaining good culture for the local community
- Educate on the importance of cultural difference tolerance
- Raise awareness on the prevail cultural norms in the locality
- Preserve cultural chance finds by relocating to an appropriate place.

#### 29. Gender Based Violence

- Inform workers about the project-related risks of gender-based violence, the prevention and mitigation measures
- Ensure the availability of effective grievance redress mechanism that minimize the reporting burden on victims
- Prepare and implement Prevention and Contingency Plan for diseases outbreak, SEA; SH/GBV
- Avoid exclusion and discrimination of vulnerable individuals

#### 30. Occupational Safety and Health Impacts

- Comply with OSHA, ESS and ESCP requirements

#### 31. Increased Pressure on Social services

As Discussed in S/N 18

## **MITIGATION MEASURES OF ENVIRONMENTAL NEGATIVE IMPACTS**

### 32. Liquid waste generation

- Developer shall be instructed to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste; and
- Train waste management to all personnel, operators and services providers.
- Designated area for wastes collection.
- Provide wastes receptacles and labeling.
- Only authorised waste collection agency at Butiama/Musoma will be engaged for collection of the waste.
- Encourage application of 3R's waste management
- Sort waste and provide waster bins accordingly
- Comply with OSHA and ESCP guidelines

### 33. Solid waste generation

- Contractor shall be instructed to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste; and
- Train waste management to all personnel, operators and services providers.
- Designated area for wastes collection.
- Provide wastes receptacles and labeling.
- Only authorised waste collection agency at Butiama/Musoma will be engaged for collection of the waste.
- Encourage application of 3R's waste management
- Sort waste and provide waster bins accordingly
- Comply with OSHA and ESCP guidelines

## **DECOMMISSION PHASE**

### Mitigation measures for significant social impacts

#### 34. Loss of jobs

- Provide information on other employment opportunities
- Conduct seminars for workers preparations after job termination
- Advise alternative livelihoods

#### 35. Loss of aesthetic value due to haphazard disposal of demolished waste

- 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.
- All the necessary health and safety measures shall be implemented
- Restore the affected land.

#### 36. Impaired surface water quality

- Install and maintain sediment control structures
- Install appropriate treatment facilities for liquid and solid waste.
- Confine movement/activities of machines/equipment/vehicles to designated areas
- Dispose spoil material to designated sites
- Undertake reclamation and re-contouring of exhausted mines

- The Mchuchuma-Liganga road be constructed to bitumen standard.

#### 37. Impaired underground water quality

- Dispose spoil material at designated sites
- Undertake ground water pollution investigation outside the project site to trace any contamination downstream of the project area

#### 38. Dust and noise

- A site waste management plan will be prepared by the contractor prior to commencement of demolition works.
- The contractor will close the surface with water to suppress excessive dust.

### **Monitoring and Auditing**

The EIS presents an outline of the Environmental and Social Monitoring Plan (ESMP) to record parameters to be monitored and frequency of monitoring.

### **Cost Benefit Analysis**

The EIS presents an assessment of the project, in terms of negative impacts, compared to the socio-economic benefits that will not happen if the project is not implemented. Environmental cost benefit analysis has been assessed in terms of the negative versus positive impacts. The potential benefits of the project, in terms of financial and social benefit are substantial. Similarly, the environmental impacts can be reasonably mitigated and the financial resources needed to mitigate negative impacts, when compared to the required investment, are relatively small.

### **Decommissioning**

A preliminary decommissioning plan has been developed. Should the decommission become inevitable the plan provides a general description of decommissioning methods considered feasible for the proposed project. The description is intended to demonstrate that the methods considered are practical and that they protect the health and safety of the public and decommissioning personnel. Project decommissioning has five phases: (1) pre-removal monitoring; (2) permitting; (3) interim protective measures; (4) Project removal and associated protective actions; and (5) post-removal activities, including monitoring of environment and socio-economic activities.

### **Conclusion**

Based on this ESIA, it is evident that the proposed project will greatly contribute to provision of quality education to students for country economic development. The study has proposed mitigation measures for the evaluated negative impacts and therefore causing no major effect to the environment and social components. Enhancement measures for positive impacts has been developed in such a way that will benefit more local communities near the project. This will be done by making the



process transparent and give priority to local communities who are willing to work and have relevant skills.

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## **ACRONYMS AND ABBREVIATIONS**

AET	Agriculture Education and Training
ASDP II	Agriculture Sector Development Program II
BCR	Benefit Cost Ratio
CAADP	Comprehensive African Agriculture Development Program
CCM	Chama Cha Mapinduzi
CBA	Cost Benefit Analysis
CBOs	Community Based Organizations
CPD	Continuing Professional Development
ESCP	Environmental and Social Commitment Plan
ESS	Environmental and Social Standards include:
EIS	Environmental impact Statement
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
EMA	Environmental Management Act
FBOs	Faith Based Organizations
FYDP	Five-Year Development Plan
GDP	Gross Domestic Product
GBV	Gender Based Violence
MJNUAT	Mwalimu Julius K Nyerere University of Agriculture and Technology
MoEST	Ministry of Education and Science and Technology
MID	Middle Income Countries
NGOs	Non-Government Organization
NSGRP	National Strategy for Growth and Reduction of Poverty
PASS	Private Agriculture Sector Support Trust
PI	Public Investment
PPA	Public Procurement Act
SAGCOT	Southern Agriculture Growth Corridor of Tanzania
SEP	Stakeholder Engagement Plan
SIDO	Small Industry Development Organization
SMEs	Small and Medium Enterprises
STEM	Science, Technology, Engineering and Mathematics
SUA	Sokoine University of Agriculture
TADB	Tanzania Agriculture Development Bank
TAFSIP	Tanzania Food Security Investment Plan
TBS	Tanzania Bureau of Standards

HEET  
WEMO

High Education for Economic Transformation  
Ward Environmental Management Office

## **CHAPTER ONE**

### **1.0 INTRODUCTION**

#### **1.1 Background**

The Government of Tanzania decided to establish Mwalimu Julius K. Nyerere University of Agriculture and Technology (MJNUAT) in 2013 by the Universities Act, 2005. MJNUAT is established under the support of the Higher Education for Economic Transformation (HEET) Project. The construction period is estimated to be 18 months starting from December 2023. HEET Project will employ a total of 1005 workers at different phases of the mobilization and construction period. Out of this 330 will be skilled and 675 unskilled labor. The Project is funded by the World Bank through the Ministry of Education, Science and Technology (MoEST) and it will last for five years starting from September 2021 up to September 2026. HEET Project focuses on the development of requisite strategies that support and catalyze transformative changes of the key sectors, with the view to build an industry-centered economy; attain a middle-income country earning status and reduce unemployment. This national aspiration takes into account 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]. They also assert the importance of Agricultural Education and Training (AET) in transforming the agricultural sector, 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 agri-business, which includes commercial agriculture, agro-processing industry and trade.

Agriculture is the main sector that shoulders a big share of employment opportunities, food supply, national export earnings and it is the lifeline of rural economies in most of the sub-Saharan African countries including Tanzania. Tanzania's Five Years Development Plan [FYDP II] focus on building an industry-centered economy, attaining the middle-income country status by 2025 and reducing unemployment through a multi-sector transformative framework. The envisaged agricultural sector transformation in Tanzania is also enshrined in the National Livestock Development Policy of 2006, the National Agriculture Development Policy of 2013 and the National Fisheries Development Policy of 2015. Although Tanzania has already achieved the middle-income status, aim is to reach the middle-upper category of the economy. Tanzania requires sustained, steady growth to Upper middle-income category while offering a more inclusive set of economic opportunities to improve living standards for the majority of Tanzanians (PAD, 2021). 7. The

short supply of workers with relevant skills is a major constraint to economic expansion.

Crop and animal together account for the livelihood of more than 95% of rural communities and provide about 95% of the national food requirements. The subsectors provide employment to about 65% of the Tanzanians and contribute 26.9% of the GDP (ASSP, 2022/23-2026/27). Tanzania is also endowed with a wide range of fish resources although the sector contributes only about 2.2% of the national GDP.

Youth unemployment in Tanzania is contributed by high degree of school dropouts. For instance, from 2011 to 2016, the transition rate from primary school to secondary school remained low at about 1:5 while the transition rate from secondary school to university was very low at about 1:10. Furthermore, transition of Agriculture Education and Training (AET) graduates, from the existing Higher Educations Institutions (HEI) in the country, into agribusiness has remained negligible and often graduates have continued to search for formal employment, instead of creating jobs for themselves and others by venturing into agribusinesses.

To bridge the existing gaps in the disciplines of science and technology, the Government has decided to establish the Mwalimu Julius K. Nyerere University of Agriculture and Technology. At its fully operational, the university will offer programs in broader fields of agriculture, engineering and technology business and ICT. The envisaged uniqueness of the programs centers on innovative learning outcomes, program delivery, emphasis on practical training and skill development and use of science innovation labs/centers in spearheading innovation generation. Science innovation labs/centers will thus be at the center stage of enhancing transition of graduates in business enterprises as well as enabling them to participate in innovation generation. The short supply of workers with relevant skills is a major constraint to economic expansion (PAD, 2021).

## **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:

- 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.
- University graduates struggle to find jobs, at least in part due to skills mismatches.
- 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.
- Shortage of well-trained lecturers, and the majority of academic staff use traditional teaching methodologies
- Most of higher education institutions are not currently able to access or use modern technologies to deliver training.
- 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 youth entering the labor 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.

### **1.3 Project Development Objective**

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 University Corporate Plan (CP) and the Medium Terms Rolling Strategic Plan (MTRSP) which highlight on the need for MJNUAT to establish new campuses in up country regions as one of the strategies to expand its training and learning infrastructure and increase students' enrolment. 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 6500 students by year 2025/26. This calls for the need to expand its facilities including infrastructures so as to create supportive environment towards achieving its goal.

#### **1.3.1 Project activities**

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

- i) To construct and equip (i) College of Agriculture, (ii) School of Agricultural and Bioprocess Engineering and Technology, (iii) School of ICT and Business Studies and (iv) School of Energy and Mining Engineering and Technology;
- ii) To construct and equip the Main University Library, Conference hall Administration building, farm and agro-processing production units, workshops, demonstration plots, farm structures, and few staff houses;
- iii) To increase enrolment capacity to 6500 students from this project;
- iv) To construct students' hostels to accommodate 20% of the students' population as proposed, since the institution is located on the country side where private housing might take time to be developed;
- v) To train 53 staff with a breakdown of 26 at PhD level and 52 at Master's Degree level; and

- vi) To conduct programs' needs assessment and develop 17 curricula through a comprehensive stakeholders' involvement; and
- vii) To construct other university supporting infrastructures such as roads, landscaping, wastewater treatment facilities, and solid waste collection facilities.

#### **1.4 Objectives of this ESIA**

The objectives of the Environmental and Social Impact Assessment (ESIA) are to ensure that all potential environmental, social and economic impacts of the proposed project are identified and assessed and that adverse impacts are avoided or mitigated. Direct, indirect and cumulative impacts should be fully examined and addressed. The project should be based on sound environmental protection and management criteria. The ESIA was undertaken primarily to ensure that the project will not cause significant negative environmental and socio-economic impacts that cannot be mitigated. The ESIA process involved identifying, predicting and evaluating the foreseeable impacts, both beneficial and adverse, and recommending mitigation measures that aim at eliminating or minimizing the potential negative impacts and promoting positive ones. The specific objectives for carrying this ESIA are to:

- i) determine how far the projects activities, conform with environmental management practices and environmental quality standards;
- ii) provide mechanisms to learn from experience, and to refine implementation procedures of the projects so as to mitigate adverse environmental and social impacts;
- iii) determine the scope of the investigation by setting boundaries of the study and identification of potentially significant environmental and social impacts result from the construction of the proposed project.
- iv) provide regulatory bodies with a framework for checking compliance with, and the performance of an Environmental and Social Management Plan.
- v) establish baseline information on both natural and built environment including socio-economic conditions of the proposed project area.
- vi) identify, predict and evaluate foreseeable impacts, both beneficial and adverse, of the proposed project;
- vii) ensure that environmental considerations are explicitly addressed and incorporated into the development decision making process
- viii) anticipate and avoid, minimize or offset the adverse significant biophysical, social and relevant effects of developmental proposal
- ix) protect the productivity and capacity of natural systems and ecological processes which maintain their functions
- x) promote development that is sustainable and optimizes resources use and management opportunities.

- xi) establish impacts that are likely to affect the environment before a decision is made to authorize the project;
- xii) enable information exchange, notification and consultations between stakeholders;
- xiii) develop mitigation measures that aim at eliminating or minimizing the potential negative impacts and promote positive ones and
- xiv) develop management clauses and monitoring aspects to be observed during project implementation.

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

## **1.5 Approach and Methodology of the ESIA Study**

### **1.5.1 Desk study**

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

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



### **1.5.2 ESIA Team**

A multi-disciplinary team of experienced scientists and environmental professionals was assembled to carry out the required resource assessment, generation of baseline data, determination of potential impacts and recommendation of mitigation measures. An interactive approach was adopted among the environmental team members and other project professionals. The team utilized the checklist for data gathering, analysis, and presentation. The team members conducted the reconnaissance investigations to determine the critical elements for analysis and the issues highlighted for the design and planning process. Team meetings were held to discuss the progress of investigations and analyses and facilitate data integration toward an understanding of the systems at work in both the natural and built environment. Baseline data for the study area were collected using a combination of:

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

### **1.5.3 Communication with Stakeholders**

#### ***Identification of stakeholders***

The stakeholders were identified based on their roles, relevance, and potential to be impacted or to impact the project. Most of the stakeholders that might be impacted by the project, e.g., nearby developments, local government authorities, Government Departments, Parastatal Organisation and MJNUAT, were pre-determined. In contrast, others were identified by different stakeholders, including the Proponent. Some of the stakeholders unfolded as consultations went along, e.g., groups and individuals on and in the vicinity of the project area.

#### ***Involvement of stakeholders***

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

introduction letter addressed to each stakeholder, briefing the project and asking them to raise their concerns to consultant freely.

### ***Documentation of stakeholders' concerns***

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

#### **1.5.4 Environmental Assessment**

##### **Baseline data on air quality, noise and vibration**

The six measuring stations were established to determine levels of the following: (i) Ambient dust as particulate matter in terms of TSP, PM10 & PM2.5; (ii) Ambient pollutant gases i.e., Oxides of Sulphur (SO<sub>2</sub>), Oxides of Nitrogen (NO, NO<sub>2</sub> and NO<sub>x</sub>), Carbon (CO and CO<sub>2</sub>), Hydrogen Sulphide (H<sub>2</sub>S) and Volatile Organic Compound (VOC); (iii) ambient noise, and (iv) ground vibrations. The parameters were measured within the proposed 4 project lots (MJNUAT administration Block, LOT1, LOT 2, LOT 3, between LOT 1 and LOT 2 and, LOT 4). A map and GPS codes for air quality, noise and vibration has been presented in Figure 1 and Table 1.

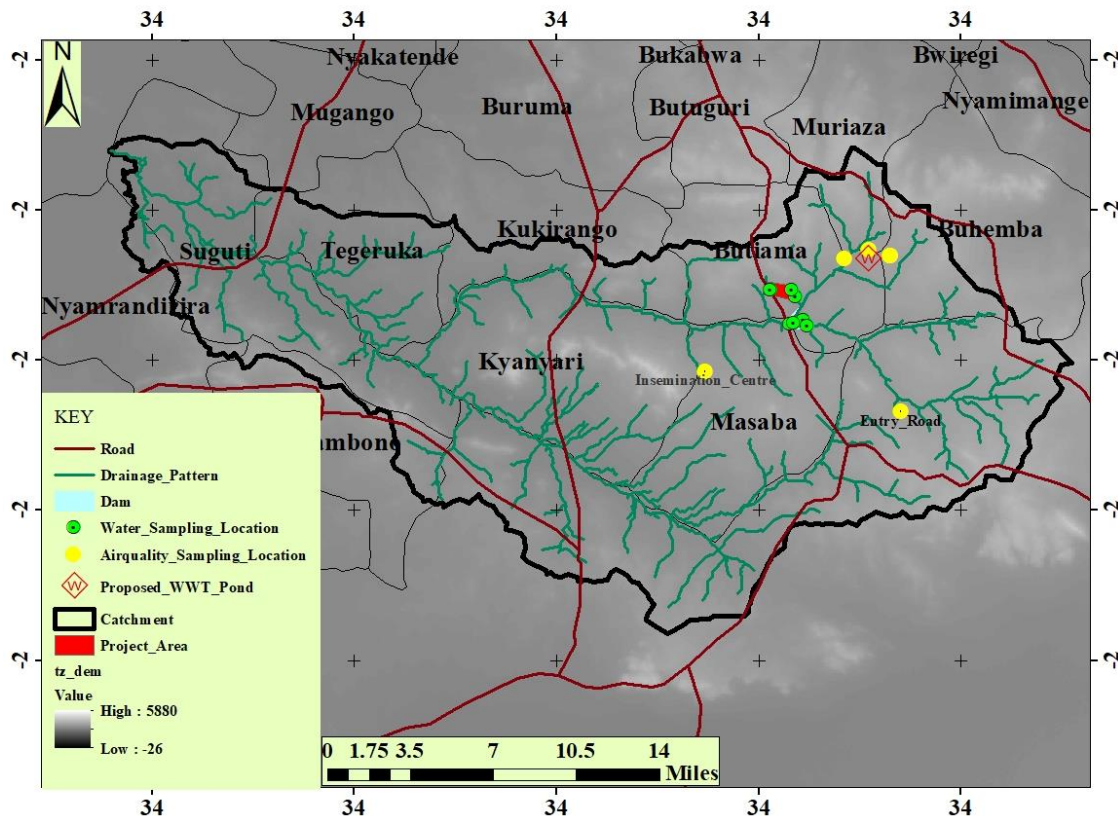


Figure 5: Air quality sampling location

#### 1.5.4.1 Determination of Ambient Dust as particulate matter

Determination of Ambient Particulate Matter (TSP and PM10) dust levels was measured by using Aeroqual series 500 monitor (S-500); an instrument that complies with EMC Directive 89/336/EEC of the European Union. The device has been tested according to the standard delivery schedule and complies with the Emissions Directive Standard EN 50081-1:1992 and EN 50081-2:1993. During measurement, the testing device was fixed at a breathing height of about 1.5 meters from the ground, which is assumed to be the breathing zone of people at their respective locality or working environment. Dust levels were recorded in terms of TSP, PM2.5 and PM10 during the morning, afternoon, evening and night hours to determine baseline data for the proposed project. The diurnal recordings measured at each point were used to calculate the daily average value. The average daily data were compared with TBS-NES standards, and WHO/IFC guidelines to check for their compliance.

#### 1.5.4.2 Noise Level

Baseline noise data were recorded at all stations established were measured during the daytime (Lday) and night-time (Lnight) in accordance to ISO 1996 - 1:2003 using a digital sound level meter. The device was held approximately 1.5 m above the floor and at least 0.5 m away from hard reflecting surfaces

such as walls. Periodic measurements were taken to grasp the mean diurnal (morning, afternoon, evening and night hours) noise values for each station. The averaged Lday and Lnight values were calculated and compared with local standards and international guidelines.

#### **1.5.4.3 Ambient Pollutant Gases**

The ambient gases were measured using Aeroqual series 500 monitor (S-500) in accordance with the manufacturer’s procedure that meets ISO 9001:2008 protocol. The device was elevated at a height of 1.5 meters above the ground; once the device is switched ON, it performs an automatic calibration for three minutes by pumping in fresh air into the sensors so as set the toxic sensors to zero. Ambient pollutant gases were measured at each station during the morning, afternoon, evening and night hours. The measured gas parameters were then compared with TBS-NES limits and World Health Organization (WHO) guidelines to check their compliance.

#### **1.5.4.4 Vibrations**

Ground vibrations were monitored using a vibrometer data logger, which is designed to measure ground vibrations according to European standard EN 14253:2003. On taking measurements, the accelerometer transducer was mounted on the ground vibrations to record vibrations. To produce accurate results, the transducer was secured in direct contact with the ground. The levels of vibrations were recorded in terms of Peak Particle Velocity (mm/s PPV) in millimeters per second in the vertical direction to secure data associated with proposed project. At each station, periodic measurements were taken during the morning, afternoon, evening and night hours. The mean value of all recorded data at each station was calculated and used to represent that particular station and compared with National Environmental Parameters by TBS. Human detection level for vibration, British vibration standard and WHO/IFC guidelines to check for their compliance.

**Table 1 Air quality, noise and vibrations measuring stations at the proposed project site**

Code	Location	GPS Readings	
		Latitudes	Longitudes
AQMS1	Infront of MJNUAT Administration block	-1.79719	33.97238
AQMS2	LOT 3	-1.79522	33.97183
AQMS3	LOT 2	-1.79518	33.97472

AQMS4	LOT 1	-1.79660	33.97998
AQMS5	Between LOT 1 and LOT 2	-1.79555	33.97764
AQMS6	LOT 4	-1.79372	33.97571

#### **1.5.4.5 Water quality analysis**

Water quality sampling points are displayed in Table 1.

**Table 2 Water Sample locations**

S/N	Name of Sampling point	GPS CODE
01.	10m from the entrance of the Dam	S01.818942 <sup>0</sup> , E033.979236 <sup>0</sup>
02.	North west of the Dam	S01.813080 <sup>0</sup> , E033.981945 <sup>0</sup>
03.	Centre of the Dam	S01.818366 <sup>0</sup> , E033.981580 <sup>0</sup>
04.	East of the Dam	S01.820064 <sup>0</sup> , E033.990440 <sup>0</sup>
05.	Borehole(Mama Maria Nyerere)	S01.797962 <sup>0</sup> , E033.967334 <sup>0</sup>
06.	Traditional Source(Kwa Masenti)	S01.802263 <sup>0</sup> , E033.983327 <sup>0</sup>
07.	Traditiona Source(Kwa Kasamwa)	S01.797925 <sup>0</sup> , E033.980577 <sup>0</sup>

Water samples were collected from the pre-selected water sources (River and wells) that local communities use for domestic purposes. The samples were taken to the laboratories in Musoma and Dar es Salaam for analysis without causing any change in its properties. From each water source, six samples were collected. To avoid any contamination, containers for taking samples were rinsed with the water from respective sources and then collected and stored for laboratory analysis.

The collected water samples were tested for physical-chemical, and various heavy metals analysis. Samples for other heavy metals, were preserved by using analytical grade concentrated HNO<sub>3</sub> and stored in a Cool Box packed with ice until transported to Central Water Quality Laboratory in Dar es Salaam. Major cations Na<sup>+</sup> (mg/l), and K<sup>+</sup> (mg/l) were analysed using Flame Photometer. Total Hardness (mg/l), Calcium (mg/l), Magnesium (mg/l) and Chloride (mg/l) were determined by a titrimetric method using standard EDTA, HCl and AgNO<sub>3</sub> as titration solution, respectively. Fluoride (mg/l), Sulphate (mg/l), Nitrate (mg/l), Nitrite (mg/l), Phosphates (mg/l), Iron (mg/l), Manganese (mg/l) and Ammonia (mg/l)) were determined by using the UV-Vis spectrophotometer. Arsenic, Barium, Boron, Aluminium, Chromium, Cadmium, Lead, Zinc, Selenium, Copper, Nickel, Bithmus (Bi), Lithium (Li), Silver (Ag) were analysed using Inductively Coupled Plasma-Optical Emission Spectroscopy (ICP-OES).

Bacteriological water quality status in terms of Total coliform, Faecal coliform count, Total plate count, Pseudomonas, *C.Perfringes* and *Escherichia coli* were

tested in all samples. A Membrane Filtration Technique was adopted for enumeration of microbial cells in all water samples collected.

Incubation temperature and time taken for each microbial cell were determined. After the incubation, different colored colonies were identified for each microbial cell and results was expressed as colon per 100 ml. GPS coordinates for water quality sapling is provided in Table 2

### 1.5.5 Flora and fauna

Sampling points for flora and fauna is displayed in Table 1

**Table 3 Sampling Design and Sample Points**

STATION	NORTHINGS	EASTINGS
1	9802868	608059
2	9802812	608234
3	9802840	608314
4	9802852	608395
5	9802779	608482
6	9802774	608666
7	9802708	608879
8	9802009	609041
9	9801761	609046
10	9800903	608835

#### 1.5.5.1 Flora

The vegetation and wildlife assessment conducted at the study area employed the systematic, stratified random sampling techniques (Rajala, et al. 2022). The systematic sampling technique used involved the sampling intensity of 1% of the total area whereby the number of plots and plot size were calculated according to the requirement of the methodology employed. Before carrying the assessment, coordinates were acquired of the boundaries of the targeted area in order to have the shape file and have the map of the area drawn and the total area calculated to ensure that every stage and technique used have to give the intended outputs. The map of the study area was drawn and the total area was determined which was 251.3715 ha equals to 2,513,715 m<sup>2</sup>

The sample size (one concentric circular plot size) was 0.071 ha and the total number of the plots required were 35 plots with the distance of 260m between them and distance of 260 m from 1 transect to another with the total number of 6 transects from west to east. The stratified random sampling technique also was employed whereby the 6 concentric circular plots of 10m diameter

with 5m radius were established, 3 plots at the northern side and 3 plots at the southern side of the study area for the intention of capturing the regeneration information. Last methodology used was randomly sampled whereby three small concentric circular plots of 1m radius was employed for assessing herbaceous layer status.

### **Shannon Wiener Diversity Index**

Shannon Wiener Diversity Index also called Shanno Diversity index (Baeza, et al. 2017), was used for comparing species diversity among groups in the ecosystem. It is based on Claude Shannon's formular for entropy and estimates diversity (Shannon 1951). The index takes into account the number of species living in a habitat (richness) and their relative abundance (evenness). The Shannon diversity index was mathematically calculated based on the formula below:

$$H' = -\sum [ (pi) ] * \log (pi) ]$$

Where:

H- Shannon diversity index;

pi- Proportion of individuals of i-th species in whole community;

pi= n/N,

Where:

n- Individuals of a given type/species;

N- Total number of individuals in a community,

Σ- Sum symbol; and

Log- Usually the natural logarithm, but the base of the logarithm is arbitrary (10 and 2 base logarithms are also used)

Activities in the large plot of 30 m with 15 m radius:

All woody or tree species with 1 cm DBH and above were identified to the species level recorded and measured their height.

#### **1.5.5.2 Fauna**

Also all signs of the presence of the wild life and the wildlife were assessed. The signs like wildlife footprints, feathers, dungs and any signs showing the presence of wildlife were recorded and identified which kind of wildlife was present.

Other information recorded in the plot level included the plot location (GPS coordinate) at the center of the all plots including main, medium and small plots, altitude (a.s.l).

Primary data from the field surveys were compiled, cleaned and then analyzed to get the intended results using computer excel program. The assessment results portrayed tree results, herbaceous and grassy layer, and fauna species observed in the area. Moreover; the diversity indices for both trees and herbs/grasses were calculated using Shannon Weiner Diversity Index (SDI) models. SDI models are very useful decision-making tools that can tell the stability of the plant communities of a given area

#### **1.5.6 Socio-economic**

Primary socio-economic data were collected purposively from the villages surrounding the project area as they will be affected directly positively or negatively by the project. A total of 86 households were selected randomly from the households surrounding the project area. This is 20% of the total households of 420. Both structured and semi-structured questionnaires were used to gather information at household and village meetings levels, respectively. The study intended to collect data on socio-economic services including education, health, water, roads and land but also economic and livelihood activities.

Secondary data were collected through district socio-economic profile, google search and other reports. Data were collected included:

- i) Land uses and livelihoods
- ii) Community structure, employment and income
- iii) Developments underway
- iv) Infrastructure in place
- v) Water supply and other utilities
- vi) Waste management practices
- vii) Recreational activities
- viii) Energy supply
- ix) Public health and safety
- x) Access to and delivery of health, education and social services

#### **1.5.7 Policy, Legal and Institutional Arrangement**

Policy, legal and institutional arrangement were compiled from review of documents: policies, legislation, guidelines and standards. Information and data on local by-laws, institutional structures and mandates/authority were obtained from local government Council (Butiama area) and relevant committees.

### **1.6 IMPACT IDENTIFICATION, PREDICTION AND EVALUATION**

The methodology used considered all potential impacts using a standard Leopold matrix (Leopold et al., 1971), which is the best-known matrix methodology available for predicting the impact of a project on the



environment (see section 6.1). The matrix takes into account impacts on the physical environment (e.g., air quality, soil and ground water quality), the ecology (e.g., flora and fauna) and on human socio-economic settings. Environmental, health, safety risk (and other risks) is a measure of the potential threats considering the likelihood that events will cause or lead to damage or degradation and the potential severity of that damage or degradation. The general criteria listed below used to evaluate the significance of the identified impacts.

- i) Magnitude and likelihood of impact to occur
- ii) Spatial and temporal extent
- iii) Potential to implement mitigation measures and controls
- iv) Likelihood and degree/timescale of environmental recovery
- v) Value of the affected environment/social component
- vi) Level of public concerns
- vii) Political repercussions of the project

The scale of negative and positive impacts that are likely to occur were determined using a range of low (1), medium (2) and high (3), as follows:

- |    |                            |
|----|----------------------------|
| 1+ | = Low positive             |
| 2+ | = Medium/moderate positive |
| 3+ | = High positive            |
| 1- | = Low negative             |
| 2- | = Medium/moderate negative |
| 3- | = High negative            |
| 0  | = No apparent impact       |

The grades for compliance and ecosystem have also been combined, arrive at an overall grade for the aspect's environmental significance, favoring the higher of the two grades. The resulting terms for the overall assessment for each environmental aspect were defined thus:

- a) **High** – Risk/impact not acceptable (if any criteria is awarded a (H) high grade);
- b) **Medium** – Risk/impact acceptable if managed (if the criteria have grades combining (M&L) medium and
- c) low); and
- d) **Low** - Risk/impact acceptable (if all criteria are (L) low, and there will be no further comment)

The assessment also considers the contribution to local and national environmental and socio-economic issues and global environmental issues of air quality.

## **1.7 REPORT STRUCTURE**

The report is presented according to the format given in Section 18 (1 and 2) of the Environment Impact Assessment and Audit (Amendment) Regulations, 2018. It is presented as follows:

Executive Summary

Table of Contents

Acknowledgement

List of Acronyms

Introduction

- i) Project background and description
- ii) Policy, administrative and legal framework
- iii) Baseline/ Existing conditions
- iv) Stakeholders Analysis
- v) Assessment of Impacts and Identification of Alternatives
- vi) Environmental Mitigation Measures
- vii) Environmental and Social Management Plan
- viii) Environmental and Social Monitoring Plan
- ix) Resource Evaluation / Cost-Benefit Analysis
- x) Decommissioning and Closure
- xi) Summary and Conclusions
- xii) References

Appendices

## **CHAPTER TWO**

### **2.0 PROJECT DESCRIPTION**

#### **2.1 General project location**

##### **Location**

Butiama District is one of the seven districts of Mara Region of Tanzania. Its administrative centre is Butiama Town (Figure 1). The proposed buildings shall be located on plot No.1, Block F, Butiama Village, Butiama Ward, Butiama District, in Mara Region. The coordinates of the site are; -1.80357S33.97917E, -1.80040S 33.97292E, -1.79309S 33.96584E and -1.80135S 33.96978E.

## Accessibility

The proposed site is bordered by Arusha road to the South, Private farms to the East, Rwamkoma road to the East and Rwamkoma Primary School to the North. The proposed project will be located within Mwalimu Nyerere University campus. The Project is accessed through Arusha road and Rwamkoma road and is located 5km from Butiama Town Centre. The Project is 40km and 195km from Musoma Municipal and Mwanza City, respectively.

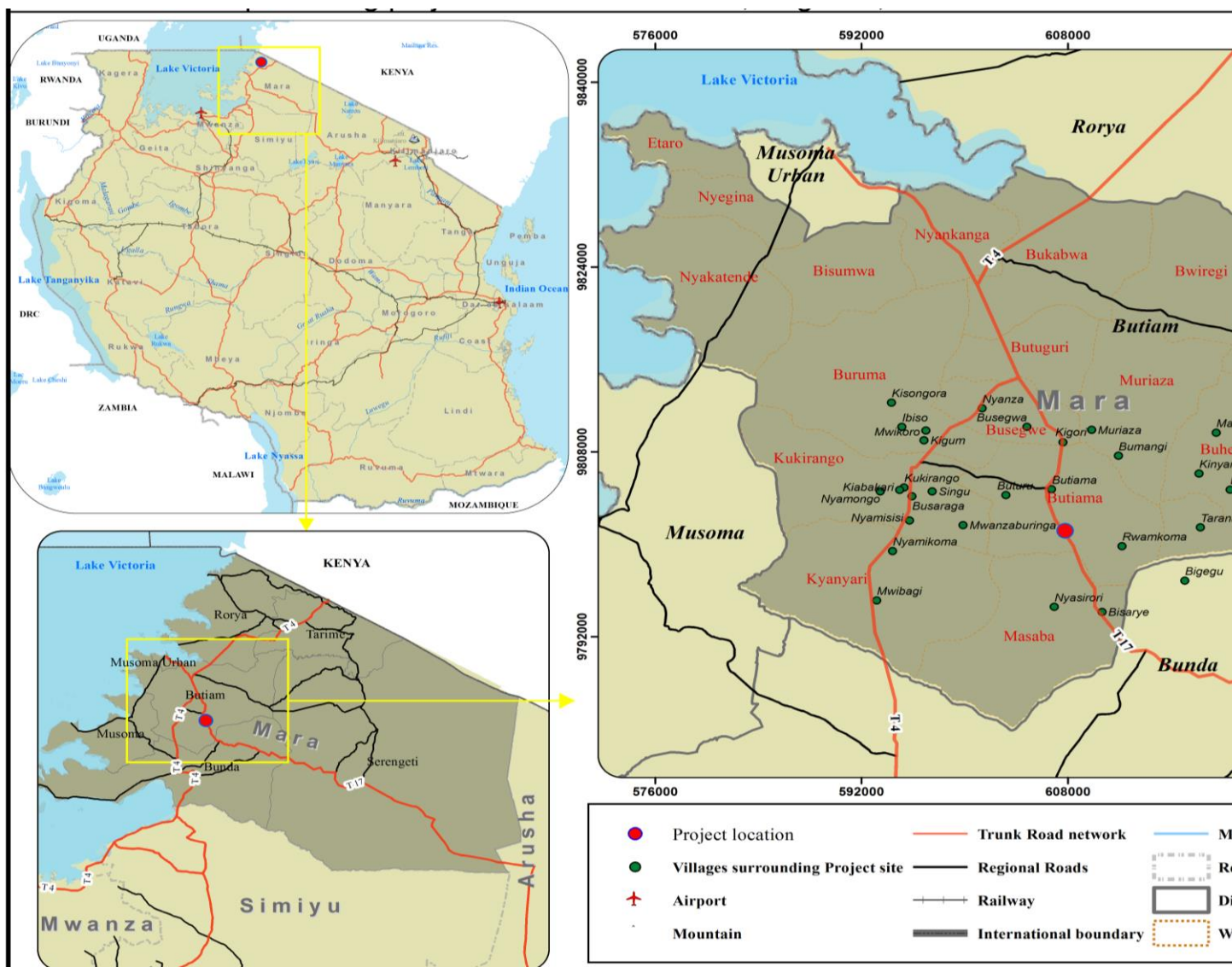


Figure 12 Location of project site in Butiama village in Mara region

## **2.2 Scope of proposed sub-project**

The proposed University Campus will be established in an area of 231.915 Hectares where various infrastructures will be constructed to accommodate 6800 students and about 1000 staff (*HEET project proposal (MJNUAT 2022)*). The land use of the proposed campus is shown in Figure 2. The presents area size and capacity for each building to be constructed are shown in Tables 4 and 5.

- i. Construction and equipping of the College of Agriculture; the construction will of involve lecture theater, lecture halls, scientific laboratories and offices. Construction will include excavation, vegetation clearance, transport of building materials, and construction of workers camps.
- ii. Construction and equipping of the School Agricultural and Bioprocess Engineering and Technology. This will involve construction of lecture halls, scientific laboratories and workshops and staff offices. Construction activities will include excavation, vegetation clearance, and transport of building materials.
- iii. Construction and equipping of School of Energy and Mining Engineering and Technology, which will involve the construction of, lecture halls, scientific laboratories and staff offices. Construction will include excavation, vegetation clearance, and transport of building materials.
- iv. Construction and equipping of Multipurpose Infrastructure (cafeterias, utilities, administration block, students' hostels, roads, conference hall and staff houses etc);
- v. Construction and equipping of the University Library;
- vi. Curriculum Development; and
- vii. Academic and Administrative staff training.

**Table 4 Size and capacity of each of the buildings**

<b>Proposed Contraction /Building type</b>	<b>Planned units to be constructed</b>	<b>Area (sqm)</b>
University wide infrastructure	Main University Library with Conference Hall including solar energy and rainwater harvesting systems, with facilities to accommodate gender interests and people with special needs.	1020
	Student Halls of Residence, cafeteria and other supporting facilities for students (solar energy and rainwater harvesting systems, infrastructure of students with special needs	2510
	Central Administration Building including solar energy and rainwater harvest systems, with facilities to accommodate gender interests and people with special needs	2297
	Integrated Infrastructures including roads and storm water drainage systems	4100
	Staff Houses for a few University's Senior staff including solar energy and rainwater harvesting systems, with facilities to accommodate gender interests and people with special needs	1609
	Outdoor and Indoor Recreational Infrastructure with facilities to accommodate gender interests and people with special needs	10,000
College of Agriculture	Administration/Offices	1137
	Lecture Theater/Office	1157
	Lecture halls Laboratories	1231
	External works	4570
School of Agricultural and Bioprocess Engineering and	Administration/Offices	1737
	Lecture halls	1623
	Laboratories	5350

Technology	Workshops	4079
	External works	1395
School of Energy and Mining Engineering and Technology	Administration/Offices	1177
	Lecture halls	1195
	Laboratories	920
	External works	330
Total		48,307

**Table 5 Size and capacity of each of the buildings**

<b>S/N</b>	<b>Type of building</b>	<b>Size (No.)</b>	<b>Qty (No./size.)</b>	<b>Capacity staff/students</b>
1	Administration Block	3 storey building	1	70
2	Seminar and Lecture rooms		75	6800
3	Students Hostels	3 storey building	3	1200
4	Library		1	2500
5	Cafeteria		2	1000



**Figure 23** Land use map for the proposed MNJUAT campus

### 2.3 Project Design

Buildings are constantly subject to several climatic and environmental elements (wind, sunlight, temperature, rain, earthquakes, and other factors). During the preparatory phase of the project, MNJUAT engaged experts in assessing and understanding risk and integrating risk management in development planning of the Campus as per Environmental and Social Standards (ESS1: Assessment and Management of Environmental and Social Risks and Impacts). Several studies were conducted during the preparatory phase of the project, as part of Risk Hazard Assessment (RHA). The studies include geotechnical investigation, topographical

surveys and environmental and social impacts assessment. Furthermore, with inputs from these studies, the project design took into consideration aspects of climate change risks, disaster risk management, gender, and occupation health and safety.

### **2.3.1 Climate Change risks mitigation and adaptation in the Project Design**

To mitigate and adapt the climate change risks (e.g. heat, drought, floods, water scarcity, etc.), the design of the MNJUAT 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:*** In the open spaces, native plants have been recommended to add the benefit of being useful for storm water treatment and infiltration in the valley, which is in the central part of the site. 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.
- ***Greenery walkways:*** The design maximizes pedestrian movement and minimizes motorized transport within the site 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 natural vegetation cover, green belt and conservation zone intend to preserve the ecosystem and control land degradation and enhance mountainous scenery. 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; 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.
  
  - ***Disaster risk management:*** The proposed project shall have provisions for fire prevention and firefighting facilities. Also, the building shall have provisions for solid waste and liquid waste management for diseases prevention. In addition, two 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. MNJUAT campus shall have an emergency management plan that assigns the responsibilities for various emergency tasks, specifically to WHO does, WHAT, WHEN AND HOW.

### **2.3.2 Gender inclusivity**

The University buildings shall be developed to be smart and friendly to gender, including considerations of persons with special needs (e.g. physical, learning impairment, emotional and behavioral). These include provisions of ramps, toilets, special rooms for lactating women, cloth changing and sanitary issues, etc.

### **2.4.4 Occupational health and safety (OHS)**

MNJUAT will protect workers throughout the project lifetime as per Environmental and Social Standards, ESS2 (Labor Working Conditions) and ESS4 (Community Health and Safety).

#### ***OHS During pre-construction phase***

During the demolition period the contractor shall provide, adequate and necessary personal protective equipment. Appropriate protective gear including, but not limited to helmets, heavy duty gloves, safety vests and boots, shall be provided to site workers and visitors. Hazards and risk awareness will be provided to workers to ensure that they are not affected with hazards during demolition. Further, 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 MNJUAT 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, MNJUAT will also apply the concept of universal access to the design and construction of such new buildings and structures.

### **OHS During construction phase**

MNJUAT 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 cholera, 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 signboards 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 must 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.

## **2.4 Project activities**

The proposed project will involve four phases namely pre-construction/mobilization, construction, operation and decommissioning. Each specific phase has its own activities and impacts, which are elaborated in the following sections and summarized in Tables 4, 5 and 6.

### **2.4.1 Mobilization or Pre-Construction Phase**

This phase entails mobilization of experts, labor force, equipment, and construction of offices/camps as well as the acquisition of various permits as required by the law. Workers camp will not be constructed within the project site. The decision for the location of the workers camp is among key activities at this stage and this will be decided after tendering process, and it will be the duty of the contractor, who shall consult MJNUAT Management on the possible location of the campsite within the project area. Table 3 provides other key activities and implementation status.

**Table 6 Activities during Pre- Construction phase**

<b>S/N</b>	<b>Activities</b>	<b>Remarks/Status</b>
1	Topographical Survey of the project site	Completed
2	Soil and Geotechnical Investigation	Completed
3	Identification of source of building materials	In progress
4	Design of various infrastructures	Completed
5	Securing of relevant permits, endorsements and clearances	Completed
6	Procurement of the Contractor	Ongoing
7	Mobilization of resources, material storage and material preparation	To be done by Contractor

8	Mobilization of the labor and equipment to the construction site	To be done by Contractor
9	Conduct ESIA and the subsequent securing of an Environmental Compliance Certificate for the project	Ongoing



**Figure 34: Part of the Project Design for Buildings**

#### *Water consumption*

Water consumption during mobilization will be mainly for drinking and will be supplied by the Constructor. Water extraction will be done as per Environmental and Social Standards, ESS3 (Resource Efficiency and pollution prevention and Management).

#### *Domestic Solid Waste*

There will be less than 15 working personnel who will include project managers and truck drivers. During this time the Constructor may start recruitment process. However, their activities are not expected to generate any significant amount of solid wastes and hence the amount is expected to be low.

#### ***Liquid Waste***

Few personnel like drivers and project managers will be active at the site during the mobilization phase. The Contractor will start putting sanitary facilities during this period.

### 2.4.2 Construction Phase

Construction activities will begin immediately after the completion of the preparatory phase. The systematic construction activities/program of work will be prepared by the Contractor. The construction activities will involve employment of skilled and non-skilled labor and, preparation of the site including vegetation clearance. This will be followed by leveling, settings and, excavation of foundations for the buildings. Once the foundations are set, erection of the structures will follow. Landscaping of the site including creation of internal road and car park will be undertaken. Landscaping will also involve demarcating the areas for gardens and paved areas as well as controlling the areas prone to erosion (inclined areas). The construction period is estimated to be 18 months starting from December 2023, and will employ a total of 1005 at differences phases of mobilization and construction. Out of this 335 will be skilled labour and 665 will be non skilled labor. Table 12 summarizes internal and external works affiliated with this project.

**Table 7 Summary of Internal and External works**

Internal Works	Excavation, Foundation formation, Concrete mixing, Foundation Wall formation, Concrete Slab Pour, Sanitary appliances installations, Lighting and Electrical works, Plumbing and Firefighting Installation, Roof Construction, Stairs formation, Windows and Doors Construction, Mechanical Systems i.e., Air Conditioning, Flooring and Tiling, Painting, and Furniture placing.
External Works	External Sanitary infrastructure construction including piping, man-holes, septic tanks and soak away pit construction, car park construction and Landscaping.

The building materials for construction will be sourced mostly from outside the project area. Also specialized building elements and installations will be sources outside the project area. Part of the material will come within the districts while others will be out-sourced from different parts of the country and beyond. Gravel and sand will be sourced from the licensed suppliers or from licensed quarry sites. Materials such as masonry units, cement, paint, timber, roofing sheets, shall be

sourced from certified suppliers. Other associated important materials for the project include; diesel fuel, lubricants and engine fluids. Greater emphasis will be laid on procurement of building materials from sites located closer to the construction site for both economic and environmental sense. Construction material obtained close to the project site will reduce negative impacts related to transportation such as dust and fumes emissions.

**Transportation of building materials:** Building materials will be transported to the project site from their extraction, manufacture, or storage sites using trucks. These include fine and course aggregates from supplies as well as other material like cement, timber and reinforcement bars will be transported by trucks to the construction site. The transportation of materials shall take into account the Environmental and Social Standards (ESS4): Community health and safety.

The building materials will be stored on site though part of them will be used directly after delivery and as such no piling up is expected. Bulky materials such as aggregates, stones, sand and steel shall be stored at contractor's yard and protected from wind and rains. Cement and reinforcement bars will be stored in special storage rooms. Timber will directly be used at the required time and consequently there will be no stockpiling of timber at the campsites.

The project development activities will employ various types of equipment and machinery. The main equipment to be involved with the project activities includes Excavator, Wheel loader, Trucks, Motor grader, and concrete mixers.

Construction work is labor intensive and requires skilled and unskilled manpower consisting of management, technical personnel and laborers. Skilled labor may include engineers, technicians, foremen, etc. The Contractor shall comply with the Employment and Labor Relation Act No. 6 of 2004 and develop a recruitment and termination strategy to ensure the right skills required by the project can be sourced locally and give equal opportunities for all. The contractor shall also comply with the Labor Institution Wage Order (2013) by paying there as per guiding labor laws in order to avoid unnecessary conflicts during the construction stage. Draft contracts shall be prepared by the Contractor, client and approved by WB and Labor Officer. Also to avoid child labor these laws as provided in POM 2021 were provided to the contractor;

- I. Relevant International Labor Organisation (ILO) Conventions ratified by Tanzania including:
  - C138 Minimum Age Convention of 1973;

- C182 Worst Forms of Child Labour Convention of 1999;

Also construction work could lead to climate change impacts through gaseous emissions and vegetation clearance. The contractor should comply with the United Nations Framework Convention on Climate Change (1992) [SEP] as well as WB ESS and EMSF.

During this period, there will be significant adverse impacts such as solid and liquid waste generation, generation of hazardous waste, deforestation, noise dust production and so forth. Table 5 displays types, quantity and treatment/disposal of wastes during construction phase

**Table 8 Types, amounts and treatment/disposal of wastes during construction**

<b>Waste</b>	<b>Type</b>	<b>Amount</b>	<b>Treatment/Disposal</b>
Solid Waste (Degradable)	General garbage (food remains, cardboards and papers)	37.5kg/day (based on generation rate of 0.25kg/day/person and 150 people)	To be collected in a large skip bucket at each site and disposed at the authorized dumpsite
	Remnants of timber	4-10kg/day	Shall be given to recyclers
Solid Waste (Non-Degradable)	Demolition waste/ rubbles	120-150 tons	Sold/given to companies authorized by NEMC to collect hazardous wastes.
	Scrap Metals (drums, iron sheets etc)	100-200kg	Sold/given to companies authorized by NEMC to collect hazardous wastes.
	Plastics	5-7kg/ day	Given to plastic recyclers
	Tins, glasses	3-5kg/day	To be collected in a large skip bucket at each site and disposed at the authorized dumpsite
Hazardous Wastes including asbestos	Scrap metals, Other Chemical mixing agents, paint	2-4kg/day	To be sold to authorized recyclers To be disposed by an authorized Hazardous waste

	containers etc		agent by NEMC
Liquid waste	Sewage	4.8m <sup>3</sup> /day (Based on 150 people, water consumption rate of 40L/capita/day and wastewater discharge factor of 80%)	To be directed to the septic tanks
	Oils and greases	None	service and maintenance of vehicles will be done at designated garages

### 2.4.3 Operation and Maintenance Phase

The quality of the construction and maintenance of infrastructure, equipment and other facilities is of paramount importance for the project sustainability. There is a need for regular maintenance and periodic rehabilitation of the infrastructure to sustain its functionality and the lifespan of the buildings.

The University organization structure has established a Directorate of Estate Services (DES) lead by the Director who will be responsible for supporting core institutional functions by providing and ensuring that the teaching, research, consultancy and outreach services are rendered within a safe environment.

Among the functions of the Director related to environmental management will be to report major defects of MJNUAT infrastructures and utilities and arrange for appropriate corrective actions and keep the surrounding environment clean and; arrange for solid waste collection and disposal.

The major activity of MJNUAT during operation phase will be staff training, student enrolment and teaching. But also there will be significant adverse impacts such as waste generation. Table 6 illustrates quantity of waste generation and disposal mechanisms.



**Table 9 Types, amounts and treatment/disposal of wastes during Operation phase**

Waste	Types	Amount	Treatment/ Disposal
Solid Waste (Degradable)	General garbage (food remains, cardboards and papers)	1,458.25kg/day (based on generation rate of 0.25kg/day/person and 5,833 people) (5,620 students and 213 members of staff)	To be collected in a large skip bucket at each site and dispose at the authorized dumpsite. An enclosure can also be constructed near the students dinning hall for waste collection.
Solid Waste (Non-Degradable)	Plastics	5-7kg/ day	Given to plastic recyclers
	Tins, glasses	3-5kg/day	To be collected in a large skip bucket at each site and disposed at the authorized dumpsite
Hazardous Wastes	Scrap metals, Other Chemical mixing agents, paint containers	2-4kg/day	To be sold to authorized recyclers To be disposed by an authorized Hazardous waste agent by NEMC
Liquid waste	Sewage	18.7 m <sup>3</sup> /day (Based on 5,833 people, water consumption rate of 40L/capita/day and wastewater discharge factor of 80%)	To be directed to the septic tanks
	Oils and greases	None	Service and maintenance of vehicles will be done at designated garages

#### 2.5.4 Demobilization Phase

After construction work is done, demobilization will be required and especially to the cleared and excavated areas. The demobilization will entail: reinstatement of the excavated areas; removal of any remaining construction materials; Use of spoils to reinstate the excavated areas; removal of spoiled material from the sloping areas to avoid the movement of soil and sediment; clearing of stock yard; transportation of construction equipment and machineries offsite which will no longer be needed at site.

The decommissioning phase is part of the reversal phase, which has the additional and often dominant risk factors associated with the materials processed/ produced during the life of the project as well as the potentially decreased structural integrity due to renovations and/or wear and tear. Similar impacts encountered during construction may be experienced in much the same way.

A decommissioning plan, that takes environmental issues into consideration, has been prepared and will be updated from time to time during the implementation of the project. The decommissioning plan will be prepared by the Contractor prior to the decommissioning phase. Decommissioning may entail change of use (functioning change) or demolition triggered by change of land use. The product of this project will have a long life span of more than fifty (50) years. Therefore, the decommissioning of the built learning infrastructure may not take place at all but only major rehabilitation works. During decommissioning there will be adverse impacts such as solid and liquid generation. Table 7 displays types, amounts and treatment/disposal of wastes during demobilization phase.

**Table 10 Types, amounts and treatment/disposal of wastes during demobilization**

Waste	Types	Amount	Treatment/ Disposal
Solid Waste (Degradable)	General garbage, cardboards and papers)	12.5kg/day (based on generation rate of 0.25kg/day/person and 50 people)	To be collected in a large skip bucket at each site and disposed at the authorized dumpsite
	Remnants of timber	4-10kg/day	Shall be given to recyclers

Waste	Types	Amount	Treatment/ Disposal
Solid Waste (Non-Degradable)	Demolition waste/ rubbles and asbestos	120-150 tons	To be collected in the Contractors haulage trucks and disposed at authorized dumping site Recycling of useful construction materials
	Scrap Metals (drums, iron sheets etc)	100-200kg	Sold/given to companies authorized by NEMC to collect hazardous wastes. Re-used in other similar projects
	Plastics	5-7kg/ day	Given to plastic recyclers
	Tins, glasses	3-5kg/day	To be collected in a large skip bucket at each site and disposed at the authorized dumpsite
Hazardous Wastes	Scrap metals, Other Chemical mixing agents, paint containers e	2-4kg/day	To be sold to authorized recyclers  To be disposed by an authorized Hazardous waste agent by NEMC
Liquid waste	Sewage	1.6m <sup>3</sup> /day (Based on 50 people, water consumption rate of 40L/capita/day and wastewater discharge factor of 80%)	To be directed to the septic tanks
	Oils and grease	None	Service and maintenance of vehicles will be done at designated garages

## **2.5 Project boundaries**

Identification of boundaries within which the EIA study is undertaken is an important component of the environmental and social assessment study. There are three types of boundaries that are considered in this ESIA study: institutional, temporal and spatial boundaries.

## **2.6 Institutional boundaries**

Institutional boundaries refer to those institutions and sectorial boundaries in which the project lies or mandated. These can be determined from political boundaries, Acts, regulations and institutional mandates and administrative structures. The proposed development is about the construction of new MNJUAT buildings at Butiama village, Musoma. Many institutions and administrative units in Tanzania are of interest;

- Ministry of Education Science and Technology
- Butiama Town Council
- Tanzania Commission of Universities (TCU)
- Fire and Rescue Force
- Occupational Safety and Health Authority (OSHA)
- RUWASA Butiama
- TANESCO Butiama
- Butiama ward
- Butiama village

These institutions were consulted in this EIA process, as they are key stakeholders with vested interest in the development at MNJUAT for environment and economic prosperity of the local people and Tanzanians in general.

## **2.7 Temporal boundaries**

Temporal boundaries refer to the lifespan and reversibility of impacts. For example, the impact of construction work for the affordable housing project may be short-lived, but the presence of these buildings in the selected site may have implications that stretch far into the future until when decommissioning is undertaken. Also, consideration needs to be given to what happens when the project ends, where there is a need for site restoration and decommissioning of the water supply system. Therefore, some of the impacts that may occur during construction, e.g., noise caused by bulldozers will disappear as soon as the construction phase will be completed. The construction period will last for not more than 36 months while the operational phase is designed for more than 99 years unless unforeseen event occurs.

## **2.8 Spatial boundary**

The spatial dimension encompasses the geographical spread of the impacts regardless of whether they are short term or long term. The spatial scale considers the receptor environmental component and can be local or broader. Two zones of impacts namely core impact zone and influence impact zone are considered.

1. The core Impact zone- the core impact zone includes the area immediately bordering the project (0-500m radial distance). In the case of this project, local impacts will include the site of the construction and the immediate surrounding areas.
2. The influence impact zone- includes the area beyond 500m from the proposed site. Most of impacts are expected to be within this boundary.

## **CHAPTER THREE**

### **3.0 POLICY, ADMINISTRATIVE AND LEGAL FRAMEWORK**

#### **3.1 Introduction**

MJNUAT will involve construction of buildings and other infrastructures. Construction of such structures as well as operation requires that policies, laws and regulations governing the industry be observed. Furthermore, Tanzania has put in place an institutional framework for management of environmental and social issues, which shall be followed during construction and operation of the project. This section, therefore discusses the Tanzania and World Bank policies, legislation and standards, which are relevant to this project.

#### **3.2 Tanzania Relevant Policies**

The following are relevant sectoral and cross-sectoral policies provide directives on how the project should be implemented. The project proponent will adhere to these policies during the designing and implementation of the proposed project.

##### **3.2.1 The National Environmental Policy (2021)**

The primary policy objective is the promotion of the use environmentally sound technologies i.e, technologies that protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products, and handle residue wastes in a more acceptable manner. The National Environment Policy (NEP 2021) is the main policy document for mainland Tanzania. It addresses issues related to environmental management. The policy covers sectors that include land and human settlements; forestry; water and sanitation; health; transport; energy; industry; wetlands; agriculture; livestock; fisheries; wildlife; tourism; and mining. NEP (2021) has relative policy statements to other sectoral and cross-sectoral policies upon which the Tanzanian environmental laws are premised. Thus, all economic and development activities are implemented in compliance with the policy.

The policy directs ESIA to be mandatory for all development projects with likely significant adverse environmental and social impacts. The establishment of MJNUAT at Butiama Main Campus will comply with all relevant measures stipulated in the policy to ensure that the projects is implemented in an economically sustainable manner whilst safeguarding environmental and social issues for the benefit of the present and future generations.

### **3.2.2 The National Water Policy (URT, 2002)**

The overall objective of the Water Policy is to develop a comprehensive framework for sustainable management of the national water resources. Policy directs concerted efforts in the protection of water sources and catchments. The policy also advocates the conservation, wise-use and minimization of water uses. This ESIA will make sure the issues of water conservation and wise use are adequately addressed in the project design. in such a way that water use is kept to the minimum by, for example, installation of plumbing fixtures such as faucets and flushing cisterns, which minimizes use of water. It will also ensure that pollution of water sources is avoided or minimized during the construction and operation phases.

### **3.2.3 The National Land Policy (2019)**

The National Land Policy (NLP 2019) aim to promote and ensure a secured land tenure system to its citizen. It encourages optimal use of land resources, and to facilitate broad-based social and economic development without upsetting or endangering the ecological balance of the environment". MJNUAT HEET project make sure that project land is used efficiently for economic gain. This ESIA will analysis different options of available land and advise the contractor and university management for optimal gain. ESIA will also make sure that the proposed project do not undermine land integrity within and nearby communities.

### **3.2.4 The Construction Policy (2003)**

Tanzania in recent years has witnessed growth in the construction industry. This includes both private projects such as residential and commercial real estate as well public projects such as construction of universities, roads, railways, bridges, water systems, telecommunications, air transport networks and so forth. Construction industry of not taken with care could lead to environmental degradation. One of the major objectives of the policy, is to support a sustainable block development sector. It emphasizes on promotion and application of cost effective and innovative technologies and practices to support socio-economic development activities such as institutional infrastructure, blocks, road-works, water supply, sanitation, shelter delivery and income generating activities and to ensure application of practices, technologies and products which are not harmful to either the environment or human health. This project is in-line with this policy as it will apply the ultra-modern technology during construction and operation phases. This ESIA addresses issues of environmental degradation and ensures that the implementation of the proposed project will as much as possible make use of cost effective and environmentally friendly technologies to minimise wastage of resources especially building materials, water and energy.

### **3.2.5 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. MJNUAT HEET Project is expected to employ about 1000 workers skilled and unskilled during various phases of the implementation. ESIA will make sure the contractors 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.

### **3.2.6 National Health Policy (2008)**

The National Health Policy of 2008 aim at improving the health status of all people in urban and rural areas, by reducing morbidity and mortality and raising life expectancy. The forthcoming construction, operation and decommissioning phases will attract a large number of people seeking for employment and other income generating opportunities. Such influx of people and rapid population growth may create health risk in the area especially on communicable diseases like HIV/AIDS, COVID 19, Marburg and so forth. The policy also advocates delivery of a high-quality pedestrian and other people friendly public realm within the city centers and urban areas to support the economic, social, cultural and environmental attractiveness for businesses, residents and visitors. It may also create conflicts with local communities on issues like access to social services. Issues of GBV and SH has serious consequences for women's physical health, as well as their sexual and reproductive health, and mental health. This ESIA responds to this policy requirements by establishing the baseline data, predicting the likely health risks and recommend mitigation measures to address significant negative impacts and propose effective monitoring plans.

### **3.2.7 The National HIV/AIDS Policy 2001**

Inspite of the remarkable progressing in addressing HIV/AIDS, the diseases has remained a challenge to many people especially youth. The policy intends to continue with the efforts of raising awareness on the level HIV/AIDS as a major development crisis that affects all sectors including construction projects. Important sections of the policy include Chapter 4, which deals with the rights of people living with HIV/AIDS, and Chapter 5, which deals with prevention of HIV/AIDS. This ESIA will adhere to the policy guidance by making sure that HIV/AIDS transmission is zero at the project site.



This will be done by taking all possible pre-cautions. Mitigation measures for prevention of HIV/AIDS, has been developed taking cognizant of this policy.

### **3.2.8 The National Mineral Policy (2009)**

The Mineral Policy of 2009 aims at strengthening integration of the mineral sector with other sectors of the economy; improving economic environment for investment; maximizing benefits from mining; improving the legal environment; Page 7 6 of the policy advocates strengthening capacity for administration of the mineral sector; developing. The key message from the policy is that mining activities should be undertaken in a sustainable manner. Reclamation of lands after mining activities is recommended. As far as this project is concerned, mining activities is directed to quarrying activities for obtaining stones and aggregates. Fine and course aggregates for the proposed project will be strictly purchased from authorised vendors. This ESIA will study and provide mitigation measures for adverse impacts from these activities.

### **3.2.9 National Gender Policy (2002)**

The 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 aim at establishing strategies to eradicate poverty, it puts emphasis on gender equality and equal opportunity of both men and women to participate in development undertakings and to value the role played by each member of the society. The policy puts emphasis on addressing GBV and Sexual harassment at work places including construction projects. GBV as elaborated in WB-ESF is wide in scope on gender-based equality and any gender violation is prohibited. ESCP has detailed issues to consider in the implementation of gender issues including GBV, SH and so forth. This ESIA will seriously investigate all possible areas of gender based violations and proposed mitigation measures. Also close monitoring will be implemented during both construction and operation of the project.

### **3.2.10 Small and Medium Enterprise Development Policy 2003**

The SME sector has a significant role to contribute towards attaining National Vision 2025 of becoming upper category of the middle-income country by 2025. Vision of the SME Development Policy is to have a vibrant and dynamic SME sector that ensures effective utilization of available resources to attain accelerated and sustainable growth. It is clear that this MJNUAT project will have significant impact on SMEs in the area. One of the major activities of ESIA Team is to liaise with the LGAs authority to build capacity on SMEs among youth and women near the project area. The ICT and Business School to be established at MJNUAT will develop comprehensive curricula on SMEs related programs.

### **3.2.11 The National Research and Development Policy (2010)**

Tanzania recognizes the power of science and technology in the 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 due to partly weaknesses of science teaching foundation, due to inadequate numbers of qualified science teachers and poor teaching environment. At the university level Research and innovations is one of the core missions. This ESIA will address critical issues for sustainable research undertaking and in compliance with the policy requirements.

### **3.2.12 The Tanzania Education and Training Policy (2014)**

To achieve economic prosperity Tanzania requires its higher education institutions, particularly universities, to prepare people to function effectively as sources of skill and knowledge and as important partners in sustainable development. The policy guide education provision from pre-primary to tertiary levels along with vocational, non-formal, and special education sectors. The proposed HEET Project aim at developing learning infrastructure which will include construction of buildings, training of academic and non academic staff, procuring large number laboratory facilities and ICT. This project focusing on producing graduates in Science, technology, engineering and mathematics including business and ICT. This Project is in-line with this policy as will modernize education training and put in place the state-of-the-art equipment for training. However, while these facilities are for modern and will have huge impact on the education but if not handled properly could lead to environment degradation. This is especially the case for hazardous products from computer and laboratory. This ESIA will address adverse impact of the project for sustainability purposes. Issues of gender and people with special needs will be addressed. Waste generation and disposal management will be proposed during all four phases of project implementation.

### **3.2.13 The Urban Planning and Space Standards Policy 2012**

Urban planning is one of the key challenges for many developing countries and Tanzania is not an exceptional. Urban growth rate is high in Tanzania especially in cities and, municipals. The Urban Planning and Space Standards 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. This ESIA, will identify areas of adverse impacts and recommend for a management plan for proper utilization of project area during its implementation.

#### **3.2.14 The Energy Policy (2015)**

Electricity demand in the country is expected to roughly quadruple by 2025 to 4,000 MW. To help meet this demand, Tanzania is targeting installed capacity of 10 GW by 2025. The Energy Policy (2015) 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 endeavors. The policy seeks to promote energy efficiency in all economic sectors. This ESIA will promote the objectives of this policy from design perspective of the building to minimize energy uses. Further it explore the use of clean energy during the project implementation.

### **3.3 LEGAL FRAMEWORK / LEGISLATION/REGULATIONS**

#### **3.3.1 Environmental Management Act (EMA) of 2004**

The Environmental Management Act (EMA) of 2004 is the main legislative reference for environmental management in Tanzania. Its enactment repealed the National Environment Management Council Act. 19 of (1983) while provides for the continued existence of the National Environment Management Council (NEMC), which was established by the same law.

Among the major purposes of the EMA (2004) is to provide the legal and institutional framework for sustainable management of the environment in Tanzania.

Part VI of the EMA (2004) deals with Environmental Impact Assessments (ESIA) and other Assessments and directs ESIA to be mandatory for all development projects with likely adverse impacts in Tanzania. 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". This ESIA is in compliance with the legal requirement. It identified significant adverse impacts on social and environment, developed mitigation measures and monitoring plans on the performance during all the life time of the project and beyond through environmental auditing.

### **3.3.2 The Environmental Impact Assessment and Audit 2005 (and its Amendment Regulations, 2018)**

According to Environmental Impact Assessment and Audit (Amendment) Regulations, 2018 (First Schedule) this project falls under Type I construction project. Type B1 project requires the proponent to submit to NEMC a Scoping report for project registration and screening which was compiled by the project.

These Regulations also provides for procedures and guidelines for carrying out ESIA in Tanzania. This ESIA has been carried out in accordance with these Regulations i.e. Registration/Screening, Scoping (including development of ToR), and Impact Assessment and proposed mitigation measures.

### **3.3.3 The Water Resources Management Act No. 11 of 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 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. It is more relevant to this project is the prohibition of discharge of waste streams into any water body including rivers without written permit from the water officer. It requires adherence to the environmental standards of water conservation and management. The proposed project intends to use large quantity of water for domestic and development activities. It will also generate a lot of liquid waste during both construction and operation. This ESIA has considered impact on water resources as significant and suggested mitigation measures as described in the following chapters.

### **3.3.4 The Water Supply and Sanitation Act No. 5 of 2019**

The Water Supply and Sanitation Act No. 5 of 2019 has been enacted to provide for sustainable management and adequate operation and transparent regulation of water supply and sanitation services with a view to give effect to the National Water Policy (2002). The Act gives penalty to defaulters or persons who may cause water pollution or dump any waste into water bodies. This ESIA has considered impact on water resources as significant and suggested mitigation measures as described in the respective chapters.

### **3.3.5 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 land Act among other things, will determine the ownership of the land where the project will be implemented. MJNUAT develop its project in a land used to be owned by the Govern and therefore no land acquisition from the communities. This ESIA will be undertaken to help local communities benefit from their land economically by raising awareness on joint investment with outsiders, or develop themselves for economic gain or lease the land at a win win situation. ESIA will also make sure that no land is degraded because of the project by identifying adverse impacts and proposing mitigation measures.

### **3.3.6 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. Only registered contractors shall be involved in the implementation of the proposed project. The ESIA will ensure that the proponent comply with the law requirements during the recruitment of contractors for MJNUAT project implementation

### **3.3.7 The Employment and Labor Relations Act No. 6 of 2004**

From the nature of construction and operations activities, there will be significant labor employment opportunities. It is expected that about 1000 skilled and non skilled workers will be employed during different periods of project development. However, the Act prohibits employment of children (children below the age of 14 years) and forced labor. In addition, it prohibits any discrimination policies or practices and directs equal opportunities for employment for all including the rights of employees to form and/or join a trade union. It further requires an establishment of a contract between employer and employee that specifically states the obligations of employer and employee. This ESIA has highlighted child labor employment as significant negative impact and directed the contractors, MJNUAT and LGAs to observe and adhere to the laws. Also employees' rights and dues will be elaborated in the contractors 'contracts. Also it has recommended a complete prohibition of biasness against gender and people with special needs as well as GBV and SH at the project area.

### **3.3.8 The Occupational Health and Safety Act No. 5 of 2003**

The Act requires assurance of safety to workers during project construction, operation and demolition. It states that at least one safety and health representative

should be available for every 100 employees working in offices. Safety shall be ensured against any mechanical machinery (cranes, chains, vehicles, etc.), chemicals (fumes from generators, etc.), liquid and hazardous materials (electrical installations and apparatus, toxic materials, wastewater, etc.) and fire. In this ESIA development of Occupational Health and Safety management Plan is one of the contractual obligation for the contractors and the ESIA Team will undertake close monitoring for the site.

### **3.3.9 Public Health Act No. 1 of 2009**

Part VIII of the public health Act give general provision for any developer to design an area for the disposal of the waste generated from the area. Furthermore, it demands provision of adequate and functional sanitation facilities. This ESIA in compliance with this law. It has investigated all possible health risks, recommended mitigation measures and monitoring plan as presented in the respective chapter.

### **3.3.10 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. Section 29-(1) of the law states that "*Notwithstanding the provisions of any other written law to the contrary, no person shall develop any land within a planning area without planning consent granted by the planning authority or otherwise than in accordance with planning consent and any conditions specified therein*". This ESIA did all the required work to make sure no one has claim on land legally or illegally.

### **3.3.11 The HIV and AIDS (Prevention and Control) Act No. 28 of 2008**

The Act generally requires that adequate information on the acquisition, transmission, prevention and post-infection of HIV/AIDS is provided to the public including workers at workplaces. It stipulates that every employer (here, the Contractor), in consultation with MJNUAT, to establish and coordinate a workplace program on HIV/AIDS. The program must include, among other things, the provision of gender responsive HIV/AIDS education and protection gears including condoms, which meet Tanzanian standards as certified by TBS. As a consideration of right to privacy, the Act prohibits compulsory HIV testing to any person as a condition necessary to obtain its requirements including a job. It further requires total confidentiality of results of HIV tests of any person against his/her own will except for special cases involving children, disabled persons, spouse or sexual partner or court. To ensure persons living with HIV/AIDS are not discriminated, the Act prohibits any forms of such discriminations and requires that no person be denied admission, participation or continual job place after diagnosed with HIV and consequently living with HIV/AIDS.

This ESIA has identified areas/activities that could lead to significant impacts of HIV/AIDS and suggested mitigation measures. Also issues related to HIV/AIDS management will form part of the contractual obligation by the contractors.

### **3.3.12 The Architects and Quantity Surveyors Act (2010)**

The Act requires architects and quantity surveyors (QS) to be registered with the Board before practicing. Only registered architects and quantity surveyors shall be involved in the implementation of the proposed project. This ESIA will ensure that the proponent comply with the law requirements during the recruitment of contractors for MJNUAT project implementation

### **3.3.13 The Fire and Rescue Act, No. 14 of 2007**

According to the Act, among others, the functions of the force are to: (a) Extinguish fire (b) grade cities, municipalities, townships and villages into various fire and rescues services levels (c) conduct fire inspection and investigations for purposes of obtaining information relating to the causes of fire and loss inflicted by fire (d) Conduct studies on investigation of arson and accidental fire (e) Conduct training for fire department personnel, other officers and voluntary fire fighters (f) Prepare fire statistics and fire service information (g) Conduct fire tests on protection facilities, equipment and materials. In section 3(1) (g), it covers premises of facility used as a place for storage flammable liquids, gas or chemicals. The Act also obliges the owners and managers of the structures to set aside places with free means of escape, and install fire alarm and detection systems, or such other escape and rescue modalities in the event of fire. Design and construction of all buildings shall take into strict considerations requirements specified in this Act. This ESIA will ensure that the proponent comply with the law requirements during the construction, operation and decommissioning of the project.

### **3.3.14 The Education (Amendment) Act, 1995**

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

### **3.3.15 The Universities Act No. 7 of 2005**

Universities Act No. 7 of 2005 provides for establishment of the Tanzania Commission for Universities (TCU) to provide the procedure for accreditation of institutions of higher learning and other related matters. Among other functions, the TCU accredits higher education institutions; coordinates admissions into state institutions of higher education; examines and accredits academic programmes submitted to it by institutions of higher education; make regulations in respect of admission of persons seeking to enrol in institutions of higher education; and, make visitations and inspection of higher learning institutions for ensuring compliance with relevant regulatory instruments. The proposed MJNUAT will be regulated by the Tanzania Commission for Universities (TCU) for ensuring that quality education is offered, which meets the needs of all the stakeholders in line with this Act.

### **3.3.16 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). Therefore, proponent shall adhere to the requirement of this Act in the process of the Electricity purchase from TANESCO.

### **3.3.17 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. The proposed project will utilise the current public roads and therefore obliged to observe the requirement of this Act.

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

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. 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.

### **3.3.19 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. MJNUAT will have its own bylaws for campus environmental management.

### **3.3.20 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. This ESIA will fulfil this legal requirement by proposing mitigation measures in all project phases, from design, construction and operation.

### **3.3.21 The Child Act, 2010**

The legal framework for child labor 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. The project proponent will protect against child labor, especially during the construction period. This ESIA will put all the measures in environment mitigation and monitoring plans including demanding contractor to develop a labor management plan.

### **3.3.22 The Grave Removal Act, (No 9 of 1969**

The Grave Removal Act of 1969 provide for the removal of graves from land required for public functions. This Act under section 3, stipulate that “where any land on which a grave is situated is required for a public purpose the Minister may cause such grave and any dead body buried therein to be removed from the land and, in such case, shall take all such steps as may be requisite or convenient for the re-instatement of the grave and the re-interment of the dead body in place approved by him for the purpose”. Here the Minister is the Minister of Land. The act specifies, among other things, that graves shall be relocated, after official notice is given to interested parties and published in the Gazette with due regard to the views of the persons interested and the religious susceptibilities of the members of the religious community to which the person belonged whose grave or dead body it is; in a manner which is not injurious to public health; in accordance with such directions as may be given by the public officer appointed by the Minister to supervise the undertaking; and accompanied by such religious rites or ceremonies as are appropriate to the religious community to which the person belonged whose dead body is removed.

## **3.4 Tanzania National Plans, 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:

### **3.4.1 The Tanzania Development Vision 2025**

Vision 2025 provides a solid foundation for a competitive and dynamic economy with high productivity. Consistent with this vision, Tanzania of 2025 should be a nation imbued with main attributes of high quality livelihood. peace, stability and unity. The Vision 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:

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, absence of abject poverty, a well-educated and learning society.

1. Good governance and the rule of law moral and cultural uprightness, adherence to the rule of law, elimination of corruption.
2. 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.

MJNUAT HEET Project is one of the important projects to contribute to national achievement of this Vision objectives notably eradicating poverty. The University will contribute to the attainment of the 2025 Vision through provision of adequate skilled labor force in STEM and business who will be capable for implementing various development plans.

### **3.4.2 The Third National Five-Year Development Plan (FYDP III; 2021/22 – 2025/26)**

The Plan is one of the strategic areas to achieve the goals set in the National Development Vision 2025. 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. Although Tanzania has already achieved the middle income status but it is on the lower category, aim is to climb to the upper middle income country. MJNUAT HEET Project supports this development plan by increasing academic, research and

innovation opportunities in STEM which are critical skills for achieving the Vision goals. One of the duties for this ESIA undertaking is to make sure that this project benefits is inclusive by accommodating interest of gender and people with special needs.

### **3.4.3 The National Plan of Action to End Violence Against Women and Children (NPA-VAWC) 2017/18-2021/22**

Violence against women and girls is a human rights violation, and the immediate and long-term physical, sexual, and mental consequences for women and girls can be devastating, including death. 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, MJNUAT HEET Project will make sure that the contractor adhere with this Plan. Also through ESIA stakeholders engagement government officials, social welfare officers, religious leaders, and police officers will be involved during implementation of the proposed project to end existing Violence against Women and Children.

### **3.4.4 Tanzania Education Sector Development Plan (ESDP) 2021/22-2025/26**

This ESDP covered the five-year period from 2021/22-2025/26, which aligned with the National Five-Year Development Plan 2021/22-2025/26. Despite Issues raised It is built on the priorities of the Tanzanian Government as set out in the Tanzania Development Vision 2025, the National Five-Year Development Plan 2021/22-2025/26 and the Education and Training Policy of 2022. The ESDP focuses on ensuring equitable access to education and training for all, including the most disadvantaged. Progress towards achieving all of the targets will be tracked through a rigorous Monitoring and Evaluation Framework, This will disaggregate results by gender and by geographical location, as well as having a particular focus on disadvantaged groups such as orphans and vulnerable children, and children and adults with learning disabilities including physical disabilities. This ESIA through stakeholders engagement and ESMP will make sure that this project is all inclusive development that address the diversity of its population. The same will be communicated to the contractors through contracts.

## **3.5 National Regulations**

### **3.5.1 The Environmental Management (Environmental Impact Assessment and Audit) (Amendment) Regulations (2018)**

The Environmental Management (Environmental Impact Assessment and Audit) Amendment Regulations, 2018 are read as one with the EIA and Audit regulations, 2005 are made under Environmental Management Act No. 20 of 2004. The regulations provide the basis for undertaking Environmental Impact Assessment (EIA) and Environmental Audits for various development projects with significant environmental impacts in the country. These regulations set procedures for conducting EIA and environmental audit in the country. The regulations also require registration of EIA experts.

In accordance with the Tanzania Environment Impact Assessment and Audit Regulation of 2005 and revised in 2018, project activities to be funded will be categorized according to the extent of environmental and social impacts of the sub-projects. That is whether impacts are low impact, site specific and that can be prevented and mitigated if all responsible parties apply the prevention and mitigation measures.

The First Schedule gives list of projects requiring and not requiring EIA and it categorizes projects into four categories:

- Type A – Category for mandatory project
- Type B1 – Category for borderline project
- Type B2 – Category for Non-Mandatory and

Special Category – project where potential risks are uncertain and requires detailed specialized study prior to ESIA.

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

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

### **3.5.2 Environmental Management (Solid Waste Management) Regulations of 2009**

The Environmental (Solid Waste Management) Regulations of 2009, provides principles for management and control of solid waste including administration and institutional arrangement, licenses and permits. Regulation 5 (1) states that, any person who owns or controls a facility or premises which generates waste shall minimize the waste generated by:

Regulation 17 (b) prohibits any person to deposit certain solid wastes of corrosive, carcinogenic, flammable, persistent, toxic, explosive, or radioactive nature materials into receptacles. Regulation 17 (c) prohibits any person to deposit any liquid, acid, paint, printers' ink, oil, oil sludge, asphalt emulsion, viscous fluid or similar product into receptacles. PART VI of the regulations is on plastic waste management. Regulation 35-(1) requires any person to ensure that plastic materials are separated from non-plastic materials and deposited into receptacles prescribed by local government. Regulation 35-(2) states that duties to segregate waste apply to all stages of waste management including collection, transportation and final disposal. This ESIA has identified and predicted solid waste generation to be significant impacts and provided mitigation measures as presented in the respective chapter.

### **3.5.3 The Environmental Management (Registration and Practicing of Environmental Experts) Regulations, 2021**

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

### **3.5.4 The Environmental Management (Fee and charges) (Amendment) Regulations, 2021**

These Regulations specify the amount of environmental fees for various operating projects and other fees for assessment. Of particular importance to this project is annual fees to enable the Council to undertake to monitor and audits to ensure the environmental obligation stipulated in the EIA report is adhered to during all project phases. Thus, the OUT shall adhere to these regulations by paying the required fees timely to the Council.

### **3.5.5 The Environmental Management (Air Quality Standards) Regulations, 2007**

The objective of this standard is to set baseline parameters for air quality and emissions within acceptable standards. It enforces minimum air quality standards prescribed by NEMC to industrialists for the purpose of adopting environmental friendly technologies to ensure protection of human health and environment pollution sources.

The standards prohibit emissions above the prescribed standards unless the emitter obtains permission to be exempted or obtain air pollutant emission permit. Fugitive dust emissions represent the most likely issue requiring avoidance or mitigation during the mobilisation and construction phase. The limit for dust emissions in terms of the Second Schedule to the Regulations is 250mg/Nm<sup>3</sup> (mean over a 24 hour period). The proposed project will have to abide to Environmental Management (Air Quality Standards) Regulations 2007, and the current assessment is within the required standards. During project implementation the regulations will be complied with to ensure dust emissions from the project are within the acceptable limits.

### **3.5.6 The Environmental Management (Soil Quality Standards) Regulations, 2007**

The objective of this standard was to set limits for soil contaminants in agriculture and habitat. It enforces minimum soil quality standards prescribed by NEMC to maintain, restore and enhance the sustainable productivity of the soil.

The standards prohibit discharge onto soil any material which will interfere with its natural quality or be polluted unless the person obtains permission to be exempted or obtain soil pollutant discharge permit. Contaminants of heavy metals in habitat and agricultural soils shall comply with parameters and upper limits specified in the standards.

Elevated levels of heavy metals may occur naturally within the soils surrounding. However, any proposed expansion projects will be designed to avoid the release of contaminants, with elevated levels of heavy metals, to the environment. The proposed project will have to abide to this regulation by discouraging haphazard disposal of wastes to the environment.

### **3.5.7 The Environmental Management (Water Quality Standards) Regulations, 2007**

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

The standards prohibit discharges above the prescribed standards unless the emitter obtains permission to be exempted or obtain a water pollutant emission permit. The regulation recognizes the requirement to obtain a water user permit as detailed in the Water Resources Management Act, 2009 and attaches additional conditions to securing the permit which requires an EIA statement of the permit application to be submitted to NEMC.

These regulations also include effluent standards (First Schedule – Permissible Limits for Municipal and Industrial Effluents), drinking water standards, specific effluent standards for particular industries and distances from pollution sources to water sources of which the proposed project must adhere to specifically when managing discharges from the project activities including research training and undertakings.

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

The power of formulation of standards for the control of noise and vibration pollution is delegated to the national environmental management standard committee. Among the responsibilities of the committee is to set minimum standards for emissions of noise and vibrations pollution into the environment. The regulation prohibits a person to make any loud, unreasonable, unnecessary or unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and of the environment describes the permissible noise levels from different facilities. According to Regulation 8 Part V, the owner of the machinery or the occupier of the facility or premises has a duty to control noise. Second schedule of the regulation stipulates the tolerance limits for environmental vibration. The provisions of these regulations will guide in ensuring that noise and vibration levels do not exceed the maximum thresholds specified.

### **3.5.9 The Environmental Management (Hazardous Waste Control and Management) Regulations, 2019**



The Regulations require every person living in Tanzania to have a stake and a duty to safeguard the environment from the adverse effects of hazardous wastes and inform the relevant authority on any activity and phenomenon resulting from hazardous waste that is likely to affect the environment and human health. Further the regulations require a generator of hazardous waste to be responsible for the sound management and disposal of such waste. They shall be liable for damage to the environment and injury to human health. MJNUAT shall observe the provisions of these regulations and comply if there is any hazardous waste generated. This ESIA will do a thorough identification and projection of hazardous waste and make sure ESMP guides on how to manage it.

#### **3.5.10 The Environmental Management (Solid Waste Management) Regulations, 2009**

The regulation state that every person living in Tanzania shall have a stake and a duty to safeguard the environment from the adverse effects of solid wastes and to inform the relevant authority on any activity and phenomenon resulting from solid waste that is likely to adversely affect the public health and environment. Further, the regulation requires the occupier of any premises to be obliged to use appropriate receptacles. Also, regulations require the occupier to comply with such days and approximate times for collection of waste specified by the local government authority having jurisdiction over the premises. Thus, MJNUAT shall comply with all these requirements during the implementation of the project in all phases. The management of solid waste should be carried out in accordance with the proposed ESMP.

#### **3.5.11 The Fire and Rescue Force (Safety Inspections & Certificates) amendment Regulations, 2014**

These Regulations cover many aspects, such as administration, responsibilities and powers of the Fire and Rescue Force, its activities, fire and rescue operations, the welfare of its staff, the Minister's power, and the property groups' classification determine the levy. These regulations require fire safety inspections to be conducted and the certificate renewed annually. Failure to renew it within one month incurs a penalty of 25 percent of the fee. Thus, MJNUAT shall comply with all these requirements during the implementation of the project.

#### **3.5.12 The Environmental Management (Control and Management of Electrical and Electronic Equipment Waste) Regulations, 2021**

These Regulations apply to all categories of electrical and electronic equipment wastes with respect to generation, collection, storage, transportation, importation,

exportation, distribution, selling, purchasing, recycling, refurbishing, assembling, dismantling and disposal of electrical and electronic equipment waste or components, and their movement into or outside Mainland Tanzania. The amount of waste electrical and electronic equipment (widely known as WEEE or e-waste) generated every year in Tanzania is increasing rapidly.

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

### **3.6 Relevant International Agreements, Conventions and Treaties**

Tanzania is party or acceded to several international agreements and conventions relating to the environment. Agreements of potential relevance for the proposed development are briefly mentioned below.

#### **3.6.1 The Convention on Biological Diversity (CBD) (1992)**

Tanzania signed the CBD in 1992 and ratified it in March 1996, thereby committing to the conservation and sustainable use of biological diversity. The objective of the Convention on Biological Diversity (CBD; 1992) is to conserve biological diversity, promote the sustainable use of its components, and encourage equitable sharing of the benefits arising from the utilization of genetic resources (see [www.biodiv.org](http://www.biodiv.org)). Relevant to this project is Article 6 of the CBD, which provides general measures for conservation and sustainable use of biodiversity. Article 14, which requires parties to carry out EIA on all projects and development which may have adversely impact on the environment. It is expected that during construction, the project activities will involve clearing of secondary vegetation at the project site. However, landscaping and re-vegetation will be carried out upon completion of the works.

#### **3.6.2 The United Nations Framework Convention on Climate Change (1992)**

The UNFCCC or FCCC is an international environmental treaty produced at the UNCED, informally known as the Earth Summit, held in Rio de Janeiro from June 3 to 14, 1992. The objective of the treaty is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Article 4 commits parties to develop, periodically update, publish and make available national inventories of anthropogenic emissions of all

greenhouse gases not controlled by the Montreal Protocol (by source) and inventories of their removal by sinks, using agreed methodologies. It commits parties to mitigate GHG as far as practicable. Tanzania having ratified this convention and putting into consideration the nature of the proposed project, there is an apparent need to ensure the project activities live within the carrying capacity of the environment and to avoid the emission of potentially atmospheric debilitating gases.

### **3.6.3 The Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, 1989**

This Convention was adopted on 22nd March 1989 by 116 states in Basel, Switzerland and come into force on 5th May 1992 in accordance with article 25(1) of the Convention. Tanzania acceded to the Basel Convention on 7th April 1993. In the context of the Basel Convention, wastes are considered hazardous to people and the environment if they are toxic, poisonous, explosive, corrosive, flammable, eco-toxic, or infectious. These can be in liquid, solid or in other forms. According to the Convention various types of wastes fall under these categories. These are listed in Annex I of the Convention (as amended in Annex VIII). A list of hazardous characteristics is contained in Annex III of the Convention. The Convention requires any Party to ensure that management of hazardous wastes or other wastes is done in a manner, which prevents pollution so as to minimize the consequences thereof for human health and the environment. The proposed project will generate different types of hazardous waste, and different measures have been proposed in the mitigation chapter on how to manage generated hazardous waste.

### **3.6.4 ILO Convention: C182 Worst Forms of Child Labour Convention, 1999**

The Worst Forms of Child Labor Convention, was adopted by the International Labour Organization (ILO) in 1999 as ILO Convention No 182. The Convention supports the prohibition and elimination of the worst forms of child labor, including slavery, forced labor and trafficking in human beings. The convention was ratified by Tanzania on 12:09:2001 and by ratifying this Convention, Tanzania commits itself to taking immediate action to prohibit and eliminate the worst forms of child labor. Thus, MJNUAT shall ensure no child is employed in the project activities. Also ESS2: Labor and Working Conditions will be applied to make sure child labor issues are addressed.

### **3.6.5 ILO Convention: C138 Minimum Age Convention, 1973**

This Convention C138 (the Minimum Age Convention) provides for a minimum age of 15 years for admission to employment (temporarily set at 14 for some developing countries). The minimum age for access to employment that is likely to 'jeopardies the health, safety or morals of young persons'— that is, hazardous work – is set at 18 years of age (16 under certain conditions). A difficulty arises in relation to the definition of such hazardous work, as there is no international list of the forms of work that are considered as posing a hazard. According to the Minimum Age Convention, hazardous types of employment or work that are prohibited up to the age of 18 have to be determined by the competent national authorities after consultation with employers and workers (Article 3(2)). The Minimum Age Convention allows 'light work' to be performed by persons aged 13 to 15 (or even 12 to 14 in certain countries), provided: a) it is not likely to be harmful to their health or development; and b) it does not prejudice their attendance of school or vocational training. The convention was ratified by United Republic of Tanzania on 16:12:1998. As such, MJNUAT shall ensure no child is employed in the project activities.

### **3.6.6 ILO Convention: C148 Working Environment (Air Pollution, Noise and Vibration) Convention, 1977**

The objectives of the convention are to protect workers against occupational hazards in the working environment. The convention applies to all branches of economic activity, except where special problems of a substantial nature exist. Parties may accept the obligations of this Convention separately in respect of air pollution, noise and vibration. Measures to be taken for the prevention and control of, and protection against, occupational hazards in the working environment due to air pollution, noise and vibration shall be prescribed by national laws and regulations. Criteria for determining the hazards of exposure to air pollution, noise and vibration in the working environment and exposure limits on the basis of these criteria shall be established by the competent authority. Tanzania ratified the convention on 30:05:1983 and as such MJNUAT shall ensure workers are protected against occupational hazards.

## **3.7 Institutional Framework for Environmental Management in Tanzania**

### **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, and the minister responsible for 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 the overall in-charge of all matters relating to the environment and shall in that respect be responsible for articulation of policy guidelines necessary for the promotion, protection and sustainable management of environment in Tanzania.

The legal institutions for environmental management in the country include;

- National Environmental Advisory Committee;
- Minister responsible for Environment;
- Director of Environment;
- National Environment Management Council (NEMC);
- Sector Ministries (e.g., Ministry of Energy, Ministry of Trade, Industries and Marketing, Ministry of lands and Human Settlements, Ministry of Livestock and Fisheries, Ministry of Water, Ministry of Education, Science and Technology,
- Regional Secretariat;
- Local Government Authorities (City, Municipal, District, Township, Ward, Village, sub-village "Mtaa and Hamlet")

### **National Environmental Advisory Committee**

The National Advisory Environmental Committee is comprised of members with experience from various fields of environmental management in the public, private sector and the civil society. The advisory committee advises the Minister on any matter related to environmental management. Other functions include:

- Review and advise the Minister on any environmental plans, environmental impact assessment of major projects and activities to which environmental impact review is necessary;
- Review and advise the Minister on any environmental standards, guidelines and regulations;
- Perform other environmental advisory services to the Minister, as it may be necessary.

### **Minister Responsible for Environment**

The Minister is responsible for matters relating to environment, including giving policy guidelines necessary for promotion, protection and sustainable management of environment in Tanzania. The Minister approves EIS. The Minister may also delegate

the power of approval for EIA to the DOE, Local Government Authorities or Sector Ministries. The Minister also:

- Prescribes (in the regulations) the qualifications of persons who may conduct ESIA;
- Reviews NEMC reports on the approval of EIS;
- Issues EIA certificate for project subject to EIA;
- Suspends EIA certificate in case of non-compliance.

### **Director of Environment**

Vice President's Office through the Directorate of Environment is the custodian of all environmental issues in the country. Director of Environment heads the Office of the Director of Environment and is appointed by the President of the United Republic of Tanzania. The functions of the Director of Environment include:

- Coordination of various environmental management activities undertaken by other agencies;
- Promotion of integration of environmental considerations into development policies, plans, programs, strategies, projects;
- Monitoring and assessing activities undertaken by relevant Sector Ministries and agencies;
- Coordination of issues relating to articulation and implementation of environmental management aspects of other sector policies and the National Environment Policy

### **National Environment Management Council (NEMC)**

The NEMC's purpose and objective is to undertake enforcement, compliance, review and monitoring of EIA and to facilitate public participation in environmental decision-making. In reference to EMA (2004), NEMC among other things:

- Registers experts and firms authorized to conduct EIA;
- Registers projects subject to EIA;
- Determines the scope of the EIA;
- Sets up cross-sectoral TAC to advise on EIA reviews;
- Requests additional information to complete the EIA review;
- Assesses and comments on EIA, in collaboration with other stakeholders,
- Convenes public hearings to obtain comments on sensitive and controversial proposed project;

- Recommends to the Minister to approve, reject, or approve with conditions specific EIS;
- Makes recommendations on whether to revoke EIA Certificates, in case of non-compliance;
- Conducts Environmental Audits

### **Sector Ministries**

Under the existing institutional and legal framework the Sector Ministries are required to establish Sector Environmental Sections headed by the Sector Environmental Coordinator. In this development project, the key environment sector ministries include: Ministry of Education, Science and Technology, Ministry of Agriculture; Ministry of Water; Ministry of Livestock and Fisheries Development, Ministry of Energy; Ministry of Lands, Housing and Human Settlements Development; and Ministry of Industry, Trade and Marketing

The responsibilities of these Sector Ministries on environmental issues include to:

- Ensure environmental compliance by the Sector Ministry;
- Liaise with the DOE and the Council (NEMC) on matters involving environment and all matters with respect to which cooperation or shared responsibility is desirable or required;
- Ensure that environmental concerns are integrated into the ministry or departmental development planning and project implementation in a way which protects the environment;
- Promote public awareness of environmental issues through educational programs and dissemination of information;
- Refer to the Council (NEMC) any matter related to the environment;
- Undertake analysis of environmental impact of sectoral legislation, regulation, policies, plans, strategies and programs through strategic environmental assessment (SEA);
- Ensure that sectoral standards are environmentally sound;
- Oversee the preparation of and implementation of EIA required for investments in the sector;

### **Regional Secretariat**

The Mara Regional Secretariat, which is headed by the Regional Environmental Management Expert, is responsible for coordination of all environmental management in the region. The Regional Environmental Expert:

- Advises the local authorities on matters relating to the implementation of and enforcement of environmental By-laws/ Act;
- Creates a link between the region and the DOE and the Director General of the Council (NEMC).

### **Local Government Authorities Act, No. 9 of 2002**

Under the Local Government Act of 1982 (Urban and District Authorities), Local Government Authorities include the Butiama District Council, Divisions, Wards, Village governments and *Vitongoji*.

The Environmental Management Committee of each of the above jurisdiction:

- Initiates inquiries and investigation about any allegation related to the environment and implementation of or violation of the provisions of the Environmental Management Act;
- Requests any person to provide information or explanation about any matter related to the environment;
- Resolves conflicts among individual persons, companies, agencies non-governmental organizations, Government departments or institutions about their respective functions, duties, mandates, obligations or activities;
- Inspects and examines any premises, streets, vehicles, aircraft or any other place or article which it believes or have reasonable cause to believe that pollutant or other articles or substances believed to be pollutant are kept or transported;
- Initiates proceedings of civil or criminal nature against any person, company, agency, department or institution that fails or refuses to comply with any directive issued by any such Committee.

Other institutions that will work with MJNUAT include TANESCO, TANROADS, TMJNUATRA and MUWASA.

### **MJNUAT Project Implementation Team**

At MJNUAT a Project Implementation Unit (PIU) has been established. It has a total of 18 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 a an ESS Office. There is also a suggestion



box is in box. The rest PIU members include Coordinator, Deputy coordinator, infrastructural Development, Capacity building, Curricula development (2), Finance, ICT (2), Procurement, M&E (2), Industrial linkage and Communication officer. 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 11 summarizes responsibilities for each institution involved in ESIA.

**Table 11 Key Institutions for implementation of the project**

LEVEL	Institution	Roles and Responsibility
1. International	World Bank	<ul style="list-style-type: none"> <li>● Review sub-project screening including risk level categorization;</li> <li>● Review the ESIA's, ESMPs and site specific ESMPs;</li> <li>● Review quarterly reports by the implementing agencies;</li> <li>● Monitor compliance with the ESMF; and</li> <li>● Undertake implementation support missions.</li> </ul>
2.National	MoEST (NPIT)	<p>At the national level, NPIT to oversee key project functions including:</p> <ul style="list-style-type: none"> <li>● project coordination,</li> <li>● procurement,</li> <li>● financial management (FM),</li> <li>● and M&amp;E.</li> </ul>
	VPO's Office (NEMC, Division of Environment)	<ul style="list-style-type: none"> <li>● Co-ordinate Environmental Management Policy, Act and guidelines</li> <li>● Approval of ToR, Review of ESIA</li> <li>● Environmental monitoring and auditing</li> <li>● Advises Government on all environmental matters</li> </ul>
	Minister for Lands, Housing and Human Settlements Development	<ul style="list-style-type: none"> <li>● Issuing rights of occupancy,</li> <li>● Overseeing land use planning and issues relating to compensation and physical and economic resettlement (if any)</li> </ul>

		<ul style="list-style-type: none"> <li>• Valuation and compensation</li> </ul>
	Ministry of Water Basin water Officers	<ul style="list-style-type: none"> <li>• Responsible for issuing water use permits,</li> <li>• Enforcing laws and regulation of water quality and utilization, as well as permitted discharge levels.</li> <li>• Co-operate between sectors at the local level.</li> <li>• Resolve conflicts between water users</li> </ul>
3.Regional Authorities	Regional Commissioner's Office  District Executive Director Office <ul style="list-style-type: none"> <li>• Functional Departments – Planning, Water, Health, Community Development, Natural Resources, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Issuing relevant permits</li> <li>• Land ownership and road reserves, current land uses, neighboring activities and developments</li> <li>• Relevant permit, official public notices</li> </ul>
4. District /local level	Land Allocation Committee	<ul style="list-style-type: none"> <li>• Land approval</li> </ul>
	District/Ward Functional Departments – Planning, Water, Health, Community Development, Natural Resources, etc.	<ul style="list-style-type: none"> <li>• Extension Services</li> <li>• Key stakeholder in project implementation</li> </ul>
	Environmental Committees	<ul style="list-style-type: none"> <li>• Project Monitoring (Watchdog for the environment)</li> </ul>
	Ward Development Committee	<ul style="list-style-type: none"> <li>• Project Monitoring</li> </ul>
	Local Stakeholders	<ul style="list-style-type: none"> <li>• Project Monitoring</li> </ul>
5.Water Supply and Sanitation Authorities	Mugango -Kiabakari- Butiama Water Supply and Sanitation Authority MUWASA	<ul style="list-style-type: none"> <li>• Managing and maintaining sewerage networks</li> <li>• Managing and maintaining of water supply networks</li> </ul>

		<ul style="list-style-type: none"> <li>• Ownership of utilities within the road reserves</li> <li>• Placing, managing and relocating utilities on, over within or along the proposed project route</li> </ul>
6.TANESCO Regional Level	TANESCO Regional	<ul style="list-style-type: none"> <li>• Power supply</li> </ul>
EWURA National Level	Energy and Water Utilities Regulatory Authority	<ul style="list-style-type: none"> <li>• Setting of the tariffs and charges</li> <li>• Monitoring performance and standards with regards to quality, safety, health and environment</li> </ul>
7.Project Proponent	<p>MJNUAT HEET Project has established a Project Implementation Team (PIT) as stipulated in POM (2021) page 15 which states that Each PIT will be headed by a Project Coordinator/Leader and have staff responsible for FM, procurement, environmental and social safeguards, and M&amp;E.</p> <p>However, according to MoEST letter of 2021, 18 specialists were required to be appointed to form a PIT. Accordingly at MJNUAT 18 staff have been appointed by the Accounting Officer (VC) and issued letters of appointments including roles and responsibilities: They include:</p> <ul style="list-style-type: none"> <li>• Coordinator</li> <li>• Deputy Coordinator</li> </ul>	<p>Overall, PIT main task is to 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&amp;E of the project.</p> <p><b>Roles and responsibilities of ESS Team</b></p> <ul style="list-style-type: none"> <li>• Capacity building for GRM implementation</li> <li>• Oversee project implementation including mitigation measures through contractors</li> <li>• Ensure environmental compliance by the environmental standards.</li> <li>• Liaise with the DoE and the NEMC on</li> </ul>

	<ul style="list-style-type: none"> <li>• Other specialists include:</li> <li>• Environments</li> <li>• Social</li> <li>• Gender</li> <li>• Infrastructure</li> <li>• Capacity building</li> <li>• Curricula (2)</li> <li>• ICT (2)</li> <li>• Communication</li> <li>• Industrial linkage</li> <li>• Procurement</li> <li>• Finance</li> <li>• Monitoring and Evaluation (2)</li> </ul> <p>The PIU members all have the capacity to execute their duties as they have been appointed based on their academic competence.</p> <p>The MJNUAT Environmentalist, Social and Gender specialists, (referred to as ESS Team) forms part of the PIT Team and have relevance competence to execute their roles in the HEET Project.</p> <p>All PIT Members have attended several capacity building conducted by MoEST and WB.</p>	<p>matters involving the environment and all matters with respect to which cooperation or shared responsibility is desirable or required.</p> <ul style="list-style-type: none"> <li>• Oversee the preparation of and implementation of all ESIA's required for the project</li> <li>• Monitoring the implementation of HEET Project as per POM and PAD.</li> <li>• Attend meetings and provide guidance in the bid documents developed by PMU</li> <li>• The ESS Team also support the procurement officer in making sure that the bidding documents clearly cover the GBV, health, safety and environmental component with appropriate provisions of the same for the contractors to bid.</li> <li>• The ESS Team coordinates the preparation of ESIA and environmental and social management plans (ESMPs) done by consultant and site-specific ESMPs (SSESMP).</li> <li>• They ensure that contractors have an Environmental Health and Safety Officer (EHS), compliance requirements, including WB ESS and ESMF guidelines.</li> <li>• To review progress reports by the supervision engineer/consultant during civil works and conduct inspection of the sites regularly</li> <li>• To make sure the Contractor complies with the WB guidance on Community Health and Safety and Gender-Based Violence</li> </ul>
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	Design Consultants	<ul style="list-style-type: none"> <li>● Incorporate the issues identified in the ESIAs, ESMPS into the project design</li> <li>● To oversee casual labor welfare and remuneration</li> </ul>
	Occupational Safety and Health issues <sup>[17]</sup> <sub>[SEP]</sub>	<ul style="list-style-type: none"> <li>● Perform hazard identification</li> <li>● Hazard assessment and management</li> <li>● Risk assessment and management</li> <li>● Emergency preparedness plan and Response</li> <li>● Risks and crises management</li> <li>● Stakeholder engagement and grievance management, including in relation to the worker grievance mechanism, for the social and environmental staff.</li> </ul>
	Supervision Engineer/Consultant	<ul style="list-style-type: none"> <li>○ Assist the PIU to ensure that the necessary environmental, health and safety authorizations and permits have been obtained;</li> <li>○ Maintain open and direct lines of communication between the PIU and contractor(s) with regard to environmental matters;</li> <li>○ 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&amp;S specifications for contractors Assist the contractor in finding environmentally responsible solutions to problems;</li> <li>○ 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;</li> <li>○ Instruct the contractor(s) to stop</li> </ul>

		<p>activities which generate adverse impacts, and/or when the contractor(s) fails to implement the ESMP requirements / remedial actions;</p> <ul style="list-style-type: none"><li>○ Provide training to the contractor on the EHS requirements to be followed;</li><li>○ Monitor the contractor's environmental awareness training program for all personnel working onsite;</li><li>○ In case of any accidents or incidents, immediately notify the PIT and support the process of documenting and reporting the case to the WB;</li><li>○ Prepare written reports for the PIT such as weekly report of non-compliance issues; summary monthly report covering key issues and findings from supervision activities; and consolidated summary report from contractor's monthly report.</li></ul>
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	Contractor	<ul style="list-style-type: none"> <li>● Compliance with relevant environmental and social legislative requirements (project-specific, district- and national level), including allocating adequate budget for implementation of these requirements;</li> <li>● Work within the scope of contractual requirements and other tender conditions;</li> <li>● Prepare CESMPs based on the ESMP in the bidding documents and contracts;</li> <li>● Train workers about EHS (including relevant WBG EHS Guidelines) and the site- specific environmental and social measures to be followed;</li> <li>● The EHS officer of the contractor will participate in the joint site inspections with the PIU and Environmental Supervision Engineer/consultant;</li> <li>● Carry out any corrective actions instructed by the Supervision Engineer/consultant;</li> <li>● In case of non-compliances/discrepancies, carry out investigation and submit proposals on mitigation measures, and implement remedial measures to reduce environmental impact;</li> <li>● Propose and carry out corrective actions in order to minimize the environmental impacts;</li> <li>● Send weekly reports of non-compliance to the Supervision Engineer/consultant;</li> <li>● Send monthly progress reports to the Supervision Engineer/consultant.</li> </ul>
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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 MJNUAT will have environmental risks and impacts in core, immediate area and area of influence. Table 8 below summarizes the World Bank Environmental and Social Standards (ESS) applicable to the MJNUAT Project.

### **3.7 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) MJNUAT
- iii) National Environmental Management Council (NEMC)
- iv) Contractor;

#### **3.7.1 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.

#### **3.7.2 MJNUAT – Butiama Main Campus**

The proponent responsibility is to ensure that the implementation process of the ESMP and Mitigation measures are in line with the relevant national policies and legislations and World Bank Environmental and Social Standard (ESS1). MJNUAT 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 MJNUAT 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.

#### **3.7.3 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.

#### **3.7.4 The Contractor**

The project will be implemented by a Contractor and will be responsible to MJNUAT 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 MJNUAT 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.

**3.8 World Bank environmental and social standards**

There are 10 approved Environmental and Social Standards (ESS) to address environmental and social issues within the Bank’s supported development projects. Thus, all projects under World Bank financing must comply with Environmental and Social Standards (ESS) before is cleared for implementation. Table 3.2 shows standards which will be applicable to the construction of MJNUAT new projects. In this section, the capacity of MJNUAT in complying with Environmental and Social Standards is assessed.

**3.8.1 Relevant World Bank Environmental and Social Standards**

HEET project adheres to the World Bank’s Environmental and Social Framework (ESF), which sets out ten Environmental and Social Standards (ESSs) for Borrowers to identify, assess and manage potential environmental and social risks and impacts. Based on the nature, location and sensitivity of the proposed activities and capacity of the Borrower, HEET project has been assigned “Substantial Risk” on environmental and social impacts. This ESIA has used these ESMF and ESS to address the impacts of the proposed project and proposed mitigation measures and monitoring plans.

Under ESF there are 10 Environmental and Social Standards (ESS). This ESIA for MJNUAT will apply ESS as stipulated in HEET project as described in the ESMF which for MJNUAT are ESS1, ESS2, ESS3, ESS4 and ESS10.

**Table 12 Application of World Bank’s Environmental and Social Standards**

<b>Environmental and Social Standard(ESS)</b>	<b>Applicability</b>	<b>Requirements</b>
ESS1:Assessment and Management of Environmental and Social Risks and Impacts	YES	This Standard directly applies in assessment and management of environmental and social risks and impacts of this project. Activities that will be undertaken will include identification of adverse impacts and respective mitigation measures., screen and follow-up (monitoring) of remedies achieved through application of prevention, mitigation and compensation measures.

ESS2: Labor and Working Conditions	YES	Requirement for the Borrower to prepare and adopt labor management procedures for improvement of labor and working conditions: The project will engage community and contracted workers. The standard intends to promote the health and safety of these workers and ensure fair working conditions, non-discrimination and equal opportunity for all, It will also address provisions on child labor and forced labor. Requirements on occupational health and safety, in keeping with the World Bank Group’s Environmental, Health, and Safety Guidelines (EHSG).
ESS3: Resource Efficiency and Pollution Prevention and Management	YES	The project will use raw materials for construction of facilities, hence needs to be managed sustainably. It is anticipated that project activities such as use of heavy machines may produce gross greenhouse gas emissions wastes, chemical and hazardous materials. The Developer will develop mechanisms to reduce pollution and prevent contamination of the environment as well as to promote the sustainable use of resources including energy, water and raw. It will also avoid or minimize generation of hazardous and non-hazardous wastes. This safeguard refers to National Laws and Good International Industry Practice as stipulated in the World Bank Groups’ EHSGs.
ESS4: Community Health and Safety	YES	This standards directs Borrowers to manage potential risks to the community during construction and operation of the university infrastructures by developing mitigation measures that will prevent potential risks, impacts and at the same time promote security of the community during construction. It guides on traffic and road safety, including road safety assessments and monitoring. Addresses risks arising from impacts on provisioning and regulating ecosystem service. Proponent will assess risks associated with security

		personnel, and review and report unlawful and abusive acts to relevant authorities. It will develop measures to avoid or minimize the risk of water related, communicable, and non- communicable diseases.
ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	YES	<p>The Proponent acquired the land from the public institution. The Project site was a government earmarked for educational development purposes.</p> <p>Title Deed was obtained through a transfer from the first owner in 2019.</p> <p>Also there is no identified specie in the project area with significance conservation status (i.e. threatened, endemic or endangered as per IUCN guidelines/CITES List) in the area.</p> <p>This standard however is applicable for the proposed project compliance with the existing laws and regulation of land.</p>
ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	NO	<p>Because there is no identified specie with significance conservation status (i.e. threatened, endemic or endangered as per IUCN guidelines/CITES List) in the area. Nevertheless, the project will use raw materials for construction. It is important these materials to be utilized sustainably. HEET project will avoid adverse impacts on biodiversity, habitats and ecosystem services in around the project area. To achieve this Borrower will closely with the Ministry of Natural Resources and Tourism.</p>
ESS7:Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local	NO	<p>According to ESMF (2021), this Standard is considered not relevant as the project will be implemented in an areas where communities do not meet the definition of Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities</p>

Communities		
ESS8:Cultural Heritage	YES	This standard is applicable for the proposed project due to chance finds of physical cultural resources because the project involves demolishing and excavation of soil or causes changes in physical environment and therefore the cultural heritage happen in chance findings.
ESS9:Financial Intermediaries (FIs)	NO	This ESS is not relevant to the project.
ESS10:Stakeholder Engagement and Information Disclosure	YES	This standard is relevant to this project. It requires stakeholder engagement throughout the project life cycle, and preparation and implementation of a Stakeholder Engagement Plan (SEP). The project has a long list of stakeholders of different categories including direct and indirect, primary and secondary influential etc. Borrower will develop stakeholders' engagement plan for a systematic approach and establish good relationships with communities. It will gather their views on issues that could affect them and provide stakeholders with a mechanisms through which to raise grievances. Other issues will involve review of Butiama socio-economic profile, district development plans and field studies at the project site. The environmental assessment (ESS1) required consultations with many stakeholders, including responsible Ministries, Local Government Authorities, vulnerable people, issues of GBV/SEA/SH etc so as to get their views throughout the project life. In addition, a mechanism will be developed and operational to address grievances. SE to be conducted in a manner proportionate to the nature, scale, risks and impacts of the project, and appropriate to stakeholders' interests. This ESS specifies what is required for information disclosure and to achieve meaningful purpose for SE.

## **CHAPTER FOUR**

### **4.0 ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS**

This chapter provides the baseline environmental and social condition of the project area that will make a reference framework to mark out the potential environmental and social impacts that might arise after implementing the proposed project. The affected environment and social includes, socio-economic and biophysical environment that could be affected by, or could affect the development.

Biophysically, the project area is located within an area, which is disturbed and is devoid of species of ecologically significant like in other built-up areas of Butiama District.

#### **4.1 Biophysical baselines**

##### **4.1.1 Climate**

Butiama experiences tropical type of climate with a temperature range of 24°C to 31°C. High temperature are recorded in the months of September, October and November when the mean maximum temperatures reach up to 31.6°C. The minimum temperatures are experienced in the months of June, July and August when temperatures go down about 15.0°C average. Rainfall pattern is bimodal which ranges from 900-1240mm per annum. The short rainfall season starts from October to December while the long rains are from March to June. Butiama like many others in the world has been affected by climate change impacts. The unpredictable and erratic rainfall, prolonged drought high temperature and so forth.

##### **4.2.2 Topography and Soil**

The site has undulating feature located at the foot of Ikolokomyo hill. The district is located partly on the shores of Lake Victoria and along the Mara River. The topography of the area can increase storm water generation (flash floods) at the university campus. The location is characterized with darkish sandy soils, loose to fairly, non-plastic brownish to reddish silty sands (SM). The darkish sands are found in fine textures grained particles. It consists of fine to coarse texture up to a depth of 10 meters. The uncorrected SPT N values were found to range from 2 blows/300mm at a depth of 1.5 meters to 12 blows/300mm at a depth of 9.0 meters below ground level. The bearing capacity of the soil within the entire site is slightly variability and is achieved at a depth of 1.5 metres

below ground water. The proposed project may cause changes on the soil type this is due to the leveling activities during construction phase. Thus, consideration for soil improvement for foundation construction or preparation of roadbed must be made as good engineering practice and for the purposes of enhancing engineering performance of prepared subgrade.

### **4.1.3 Hydrology**

Water source for Butiama Campus is Lake Victoria and borehole(s) complemented by water from boreholes within the proposed project site. A number of shallow wells were recorded at 74 to 76 AMSL. The geotechnical investigation records show different levels of Ground Water Table (GWT) indicates that there are multiple perched ground water table from a depth of 3 to 6m below ground level. However, there is possibility of ground water rise especially in loose sands over clay bound marshy area. Figure 4 shows the location of project site relative to water bodies. The proposed project shall increase water use in the areas. The total estimated water consumption during operation is 2040m<sup>3</sup> /day for a projected population of 17,000. According to the Ministry of Water Designed Manual for Urban Water Supply the average, per capita water consumption for medium usage household domestic demand is 120L.

## **4.2 Primary Environmental data**

Other biophysical parameters were determined through laboratory and measurements as indicated in the following sections

### **4.2.1 Air quality**

The particulate matter (PM10, TSP & PM2.5) level records at six measured stations were within the permissible limits of both local standards and international standards. The highest average concentrations were measured at AQMS1 while the lowest average values were recorded at AQMS1 (Table 13). Such measured levels were associated with proximity of the stations to nearby wheel generated dust sources (i.e., car park) and wind impact on bare land. Therefore, the area can generally be characterized as good, as none of the measured ambient dust was found to exceed their provincial TSP, PM10 and PM2.5 standard limits.

**Table 13 Average ambient particulate matter measured at six stations**

GPS Code	Location	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
		mg/m <sup>3</sup>	mg/m <sup>3</sup>	mg/m <sup>3</sup>
AQMS1	Infront of MJNUAT Administration block	0.030	0.021	0.013
AQMS2	LOT 3	0.023	0.018	0.009
AQMS3	LOT 2	0.026	0.019	0.011
AQMS4	LOT 1	0.019	0.014	0.008
AQMS5	Between LOT 1 and LOT 2	0.024	0.018	0.012
AQMS6	LOT 4	0.027	0.016	0.010
<b>Environmental Management (Air Quality Standards), 2007</b>		<b>0.5</b>	<b>0.15</b>	<b>0.075</b>
<b>WHO/IFC (2007) and WB AQG 2006</b>		<b>0.23</b>	<b>0.05</b>	<b>0.025</b>
<b>US OSHA</b>		<b>-</b>	<b>15</b>	<b>-</b>
<b>%DAE<sub>TBS</sub></b>		<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>
<b>%DAE<sub>WHO/IFC (2007) and WB 2006</sub></b>		<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>
<b>%AE<sub>US-OSHA</sub></b>		<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>

Key: %DAET: %DAEWHO/IFC: Percentage of Daily (24Hrs) Averages Exceedances as per WHO Limits for Air Quality

%AEUS-OSHA: Percentage of 8Hrs Averages Exceedances as per US OSHA Limits for Inert or Nuisance Dust

\*CP = Control point - Stations far from the influence of the factory located on leeward side

#### 4.2.2 Ambient Pollutant Gases

Levels of ambient pollutant gaseous measured from six stations during the study period are shown in Table 14. The results show that all the measured ambient pollutant gases concentrations were within TBS permissible limits and WHO Guidelines.



**Table 14 Average ambient pollutant gases measured at six stations**

GPS Code	Location	CO	NO <sub>2</sub>	SO <sub>2</sub>	VOC	H <sub>2</sub> S
		mg/m <sup>3</sup>	mg/m <sup>3</sup>	mg/m <sup>3</sup>	mg/m <sup>3</sup>	mg/m <sup>3</sup>
AQMS1	Infront of MJNUAT Administration block	2.813	0.019	0.548	479.25	0.06
AQMS2	LOT 3	1.163	0.023	0.188	209.75	0.02
AQMS3	LOT 2	2.353	0.014	1.168	207.25	0.04
AQMS4	LOT 1	1.288	0.03	0.85	222	0.03
AQMS5	Between LOT 1 and LOT 2	2.468	0.029	0.758	170.5	0.07
AQMS6	LOT 4	3.423	0.031	1.443	78.75	0.09
<b>Tanzanian Standards Limits (TZS 845-2012)</b>		<b>10</b>	<b>0.12</b>	<b>0.5</b>	<b>6.0</b>	<b>-</b>
<b>IFC (2007) and WHO AQG 2006</b>		<b>30</b>	<b>0.2</b>	<b>0.5</b>	<b>-</b>	<b>0.1</b>
<b>%DAE<sub>TBS</sub></b>		<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>
<b>%DAE<sub>WHO/IFC (2007) and WB 2006</sub></b>		<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>

Source: Field measurements on January 2024

#### 4.2.3 Ground vibrations

The recorded vibration levels were ranging from 0.01 to 0.03 mm/s PPV, with maximum value being recorded at AQMS2 (Table 15). The anticipated impact resulting from the measured vibrations is considered less significant as the levels did not exceed the TBS and British Standard limits as well as 0.15 mm/sec PPV criteria established to evaluate the extent that can easily be detected by human. In that regard, the baseline ground vibration levels are minimal and thus unlikely to impact negatively any sensitive receptors.

**Table 15 Average vibrations measured in mm/s PPV**

GPS Code	Location	(mm/s PPV)
AQMS1	Infront of MJNUAT Administration block	0.02
AQMS2	LOT 3	0.03
AQMS3	LOT 2	0.01
AQMS4	LOT 1	0.02
AQMS5	Between LOT 1 and LOT 2	0.01
AQMS6	LOT 4	0.01
<b>Human detection level</b>		<b>&lt;0.15</b>
<b>TBS Limit</b>		<b>5</b>
<b>British Limit</b>		<b>0.3</b>
<b>% of Stations &gt; Human detection level</b>		<b>0.00%</b>

Source: Field measurements on January 2024

## Water Quality analysis

All parameters on water quality analysis and GPS codes are presented in Table 16. were not compliance with the Tanzania standards and WHO (2011) Guidelines. This is partly because all these sources comprise of shallow wells and a dam which is for public use including fishing and irrigation. The same sources are also used for livestock drinking.

**Table 16 Water quality analysis**

GPS Code	Location	Color mg/m <sup>3</sup>	Turbidity mg/m <sup>3</sup>	Bacterial pollutant mg/m <sup>3</sup>	Chemical pollutant mg/m <sup>3</sup>
AQMS1	10m from the dam entrance	189TCU	23 NTU	51.14%	2.90mg/l
AQMS2	North-west of the dam	181TCU	28NTU	51.14%	2.90mg/l
AQMS3	Center of the dam	179TCU	29 NTU	51.14%	2.90mg/l
AQMS4	East of the dam	111TCU	21NTU	51.14%	2.90mg/l
AQMS5	Bore hole (mama Maria Nyerere)	62TCU	7NTU	14.28%	1.3mg/l
AQMS6	Traditional source (kwa masenti)	590TCU	67NTU	28.57%	3.797mg/l
AQMS7	Traditional source (kwa kasamwa)	550TCU	180NTU	28.57%	4.215 mg/l
<b>Tanzanian Bureau Standards (TBS)</b>		50 TCU for (TZS 789: 2018- EAS 12: 2018 ICS	TZS 789: 2018- EAS 12: 2018 ICS is 25NTU	TZS 789: 2018- 2018	TZS789:2018 2.2mg/l
<b>World Health Organization (2011)</b>		<b>WHO (2011)</b> not specified	WHO (2011) Guidelines not specified.	WHO (2011) Guideline not be detectables	WHO (2011) not specified

*Source: Field measurements on January 2024*

### 4.2.4 Structures/Buildings

The proposed project site covers 500acre of land and in its current state contains six (6) unused/derelect building structures (previously used for Artificial Insemination Centre) with surrounding mature vegetation/trees. The buildings are roofed by asbestos materials, which need careful handling during mobilization/construction activities due to their carcinogenic characteristics. In addition, the site has 14 residential buildings, which are used, by prisons and One (1) newly constructed administration building to be used as printing unit. Also, septic tanks soak away pit and inspection chambers were observed at the site. The residential

buildings and unused buildings will be demolished, and the site will be landscaped with carefully chosen species to enhance ecology in the area.

#### 4.2.5 Infrastructure/ Utilities

The site has all necessary infrastructure at the vicinity; this covers electricity and one main road (Arusha-Musoma), which is passable throughout the year.

#### 4.3 Neighbouring area

The site is in a predominantly institutional area. The site borders Barracks to the West, Rwamkoma primary school to the North; thus, the project will complement the context. The proposed project site is located along Arusha-Musoma road and is accessed through Rwamkoma road and is situated 4km from Butiama Town Centre. It is also located 300m from Butiama Secondary School

#### 4.4 Flora and fauna

##### Woody species composition

The species recorded at the study areas consisted of **15** different species within **8** plant families (Table 17 and 18). The observed list was however found in the nearby areas outside the study area. There were, however, no any endemic, endangered or rare species observed in the study area. Any Infrastructural development in the area would not cause any harm in the existing woody species.

**Table 17 vegetation composition in the study area**

S/N	Composition	Family
1	Chromolaena odorata	Asteraceae
2	Combretum fragrans	Combretaceae
3	Euclea divinorum	Ebenaceae
4	Lannea schimperi	Anacardiaceae
5	Lantana camara	Verbenaceae
6	Maytenus senegalensis	Celastraceae
7	Ozoroa insignis	Anacardiaceae
8	Pavetta crassipes	Rubiaceae
9	Philenoptera bussei	Fabaceae
10	Pilliosigma thonningii	Fabaceae/Papilionaceae
11	Rhus natalensis	Anacardiaceae
12	Rhus vulgaris	Anacardiaceae
13	Senna siamea	Fabaceae
14	Vachellia hockii	Mimosaceae

Source: Field measurements on January 2024

**Table 18 Shannon diversity index**

Species name	Proportion(Pi)	Pi(%)	LnPi	Diversity
<i>Chromoleana odorata</i>	0.54	54.45	-0.61	0.33
<i>Lantana camara</i>	0.24	23.53	-1.45	0.34
<i>Combretum fragrans</i>	0.14	13.82	-1.98	0.27
<i>Rhus natalensis</i>	0.02	2.05	-3.89	0.08
<i>Senna siamea</i>	0.02	1.98	-3.92	0.08
<i>Maytenus senegalensis</i>	0.01	1.03	-4.58	0.05
<i>Philenoptera bussei</i>	0.01	1.03	-4.58	0.05
<i>Euclea divinorum</i>	0.01	0.75	-4.89	0.04
<i>Rhus vulgaris</i>	0.00	0.41	-5.50	0.02
<i>Lannea schimperi</i>	0.00	0.27	-5.90	0.02
<i>Pilliosigma thonningii</i>	0.00	0.27	-5.90	0.02
<i>Pavetta crassipes</i>	0.00	0.21	-6.19	0.01
<i>Vachellia hockii</i>	0.00	0.14	-6.59	0.01
<i>Ozoroa insignis</i>	0.00	0.07	-7.29	0.00

The mean number of stems was 5863 per ha (Table 18), ranging from 22917 to 14 stems per ha. There was higher SD due to a wide range of distribution of stems per ha per species.

**Table 19 Statistical Parameters showing number of stem per hectare**

Statistical parameter	Stems/ha
Mean	5863
SD	6099
Range	22917
Minimum	417
Maximum	23333
Count	14

Source: Field measurements on January 2024

#### 4.5 Statistical Parameters of the woody species.

The mean diameter for all measured stems was 2.97cm, ranging from 1.5 to 7cm respectively. The mean height, on the other hand, was 2.2m ranging from 1.5 to 3.5m. The surveyed area had a generally low number of stems as all the bigger diameter stems that has probably been removed for different human needs in the community adjacent to the surveyed area. The statistical parameters were presented in the **Table 20** as shown below.

**Table 20** Statistical Parameters of all measured stems in terms of Dbh and Height.

Statistical parameter	Dbh (cm)	Height (m)
Mean	2.97	2.2
SD	1.20	0.7
Range	5.50	2.0
Minimum	1.50	1.5
Maximum	7.00	3.5
Count	20.00	20.0

*Source: Field measurements on January 2024*

#### 4.6 Wildlife found at the study area.

During the assessment of wildlife at the study area various signs which indicated the presence of wildlife were recorded in each concentric circular plot within the four arcs of the plot and the diameter of 30 m meaning that the radii of the circular plot were 15 m from the center to the edge of the circle. During the wildlife assessment the following list of wildlife in the **Table 21** were recorded either their signs or some of them were physically seen.

**Table 21** List of wildlife found in the study area.

			STATUS
S/N	WILDLIFE	SIGN	SEEN
1	Bees	Flying sounds on flowers	Yes-Bees warm under the tree branch
2	Birds (Flamingo)	Feathers	Yes
3	Birs-Common bulbul	Sounds	Yes

4	Various birds	Sounds	Yes
4	Butterflies	No	Yes
5	Crickets	Sounds	Yes
6	Dickdick	Dung	Not seen
7	Dragonflies	No	Seen
8	Guineafowls	Feathers	Seen-A large flock
9	Here	Dung	Yes
10	Locust	No	Yes
11	Martial eagle, Bee swarm	No	Yes-Seen on the tree
12	Millipede	No	Yes
13	Tortoise	No	Yes

*Source: Field measurements on January 2024*

Overall: The assessment of vegetation and wildlife species showed no evidence of any existing endemic, endangered or rare species for both flora and fauna.

## **4.6 Socio-economic baseline**

### **4.6.1 Demography**

#### **Population**

Based on projections, the current population of Butiama Village is 281,656 people with the population growth rate of 3.1% per annum and the population density of 83 people per square kilometers. Men are 135,868 while female are 145,788. The sex ratio is 93 and average household size is 5.1. The proposed project will increase the population in Butiama ward due to students' enrollment and other service providers.

#### **Land Use**

Land uses in the district include agriculture and open land, grazing land, residential, institutional use, commercial, transport and communication. Grazing of domesticated animals, Agricultural and open land occupies the largest land area, which is used for husbandry of both perennial and annual crops.

#### **Settlement**

Most of the houses are built in un-surveyed areas following the old Ujamaa villages' residential plans which were made for accommodating people in one center where they could obtain community/social services (e.g. Dispensaries, primary school education, shopping centers etc.). Some of the houses built in Townships like Kiabakari, Butiama, Kiagata and Buhemba are of average

standards. These areas are inaccessible due to an inadequacy of good infrastructure and social economic services. The proposed project will lead to expansion of settlements and increase in social services due to the projected students' enrollment rate.

### **Child labour**

Child labor is an illegal employment of children under 18 years, to work on activities that deprive their rights; or involvement of children to heavy duties, which were supposed to be done by adults. In the district child labor is exercised in mining, illegal mining, housework, animal feeding, informal business and barmaids. The proposed project will not allow child labour.

### **Health**

The district has few health facilities that provide services to the community which are owned by voluntary agencies, private sector and the government. Considering the current growing population, the facilities are not adequate as there is one (1) Hospital and six (6) dispensaries. The major endemic diseases in the district are cholera, dysentery and meningitis. The main causes of these epidemic diseases are poor environmental sanitation, lack of clean and safe water.

### **Gender Development**

Literacy and Education have been perceived to cause unequal participation of both men and women in the development process. Few years back there was unequal consideration of education opportunities for boys and girls. Most families preferred boys to girls in this aspect. But recently, there has been almost equal enrollment and selection to primary and Secondary Education. Decision Making Participation in decision by all groups of people in the society is crucial to be taken into account; in the district there is unequal participation of men and women in decision making at village Committees, ward development committees, full council and working places. Primary data for the villages surrounding the project area is displayed in Table 22.

**Table 22 access to socio-economic services**

<b>VARIABLE</b>	<b>RESULTS (average)</b>
Gender	
• Male	65.1%
• Female	34.9%
Family size	6.8 (range 3-12)

High proportion	children under 14 years
Distance to the nearby primary school	3km (range 1-5km)
Distance to the secondary schools was	4.2km (range 1-7.9km)
Distance to health Centre	4km (range 2-7km)
Access to drinking water	90% from shallow wells and natural streams
Average land ownership	3.4 acre (ranging from 2-10 acres)
Type of land ownership	Customary and Only 8 8.1 had both customary and title deeds
Livelihood dependence	100% on agriculture and livestock keeping and about 30% do also some petty business
Issues and concerns raised	<ul style="list-style-type: none"> <li>• high proportion of the communities sale raw products without any value addition in terms of processing and packaging which result into very low prices.</li> <li>• Also inadequate extension services, social services and agriculture and livestock inputs.</li> <li>• Concerns on whether they will benefit from the forthcoming project employment opportunities and access to recreational facilities.</li> <li>• Risk of spread of communicable diseases</li> <li>• Risk of security due to influx of people</li> <li>• Risk of environmental pollution</li> <li>• Risk of accidents</li> </ul>

Source: Survey data 2022

#### **4.7 Social and Economic Infrastructures**

##### **Transport infrastructures**

There is a reliable road service between Butiama and neighboring districts, the tarmac road that connects Mara, Mwanza, Shinyanga, Singida, Dodoma, Morogoro to Dar es Salaam. Water way transport services by using the nearby Musoma port run from Musoma town to Kenya and Uganda. The Air transport depends largely on the neighboring Musoma airport, which is 52km from Butiama.

##### **Energy**

The major source of electricity in the district is the National grid. There is electricity shortage in the area due to the fact that the district is new and areas that were once considered as villages are currently being transformed into streets and thus the emphasis is being pushed upon electrifying the whole area due to its economic significance. District residents use wood based fuel in the form of charcoal and firewood for domestic heating and cooking. Most households in the



district use fossil fuel for domestic lighting mostly kerosene due to shortage of electricity. Industrial and transport uses for fossil fuels are also higher. The proposed project will aggravate the energy demand, causing an extensive deforestation hence rampant soil erosion and siltation if exploitation of wood-based fuel will not be controlled.

### **Telecommunication**

Residents in Butiama village, enjoy wireless phone communication services through five major providers namely: M/S TTCL, AIRTELL, VODACOM, TIGO and HALOTEL. These companies have installed several communication towers in order to boost reception. The presence of these communication towers will create good network communication among students.

### **Sewerage system**

There is no central sewerage system in the area. Few houses depend on onsite septic tanks and soak away pits while many residents use traditional pit latrines. Building owners and Tenants pay for the service of emptying waste/sludge from septic tanks to disposal ponds.

### **Solid waste management**

Solid waste collection is managed by the Butiama District Council. There are no collection points in the area. Domestic and commercial solid waste produced Butiama town is collected by a private contractor contracted by the Butiama District Council. The collection is done from house to house, once a week. The contractor manages to collect 90% of all the solid waste produced while the remaining 10% is self-disposed within the source's property by throwing in the pit or burning it. The collected waste is then transported to a dumpsite outside Butiama town.

## **4.8 Tourism and Recreation**

Tourism and recreation in the district is not well developed. Generally, there are little tourist activities taking place and there are few tourist attraction areas found. These include mainly the historical Museum that commemorates the legacy and life of the late Mwalimu Julius Kambarage Nyerere. Potentially, the district has beautiful recreational areas that could attract many tourists. These if developed, would include Hotels and recreational places like the stadium, Community centers, video show centres, guesthouses, etc. The establishment of the college of tourism is expected to improve the tourism industry.

## **4.9 Cross-cutting issues in Butiama District**

### Security

The security status within the district is satisfactory as there is a close cooperation between residents and the government's security entities on matters concerning the safety of people and property. This is good news to the establishment of MJNUAT campus.

### HIV/AIDS

The average HIV/AIDS transmission rate in Butiama District is 4.2%. Most affected areas include commercial, fishing, mining and areas along main roads. Deliberate efforts are set to sensitize the local community on the disease so as to curtail it to minimal levels. The proposed project may increase the prevalence rate of the disease due to the increase in interactions within the community.

## **4.10 Graves Relocation Process**

Mwalimu Julius K. Nyerere University of Agriculture and Technology HEEP Project is constructed in the Government land, which was formally owned by the Butiama Artificial Insemination Centre and later earmarked for educational development purposes. Title Deed was obtained through a transfer from the first owner in 2019.

However, in the course of preparation for construction two families emerged claiming to have a total of Six (6) graves inside the Title Land for the project. Of the two families one had 5 graves and the another had one grave making a total of six (6) graves.

In facilitating the families to relocate the graves, Graves Removal Act of 1969 was used to guide the process. The Act states that:

*“Subject to the provisions of subsection (1) of section 7 of the Act where any land on which a grave is situated is required for a public purpose the Minister may cause such grave and any dead body buried therein to be removed from the land and, in such case, shall take all such steps as may be requisite or convenient for the re-instatement of the grave and the re-interment of the dead body in a place approved by him for the purpose”.*

The Butiama District Officials administered the process. A meeting was convened at the District Commissioners Office involving the District Commissioner himself, District Legal Officer, District Executive Director, District Land Officer, family members of the deceased and the MJNUAT Management. The meeting agreed to facilitate the entire process of graves relocation.

This was followed by the inspection and identification of the type and number of graves. A team involving the Mara Regional Valuer, District Land Officer, family representatives and Village Government conducted the evaluation.

The Cost s relocation of graves was guided by Graves Relocation Law of 1969 (Graves Removal Act 1969). According to the law, relocation of one (1) un-built grave is TZS Four Hundred Thousand only (400,000 see Appendix Number 2 and 3). Thus the two families with a total of six (6) graves were paid a total of TZS 2,400,000 (signature of the received families is in Appendix Number.1) and the graves have been relocated.

## CHAPTER FIVE

### 5.0 STAKEHOLDER CONSULTATIONS AND PUBLIC INVOLVEMENT

Stakeholders are persons or groups who are directly or indirectly affected by a project, as well as those who may have either interest in a project or the ability to influence its outcome, either positively or negatively

Stakeholders are those who may be affected by the project directly indirectly. They may also include people who have a strong interest in the project. Identifying stakeholders and their interests should be among the first, if not the very first, of the items on your stakeholders' engagement. *Different methods were used to identify stakeholders including brainstorm, Collect categories and names from informants in the community, Consult using Local Government Authorities (LGAs and get more ideas from stakeholders meetings.*

#### 5.1 Stakeholders Identification

The consultants organized consultation meetings for soliciting public opinions from Ward Office and village offices. The consultant team also held interviews and meetings with officials from government ministries, departments and agencies and district as per ESS10 (Table 5.1). Thus, the following emerged as the key stakeholders for proposed construction of MJNUAT buildings and their names and signatures are shown in Appendix section. Stakeholders shall be continuously consulted during the project life as per SEP and ESMF prepared for HEET project implementation.

**Table 23 Key stakeholders**

Stakeholder	Justification
Project Proponent –Ministry of Education Science and Technology	These are statutory body with regard to EIA approval process and thus were automatically involved
Ministry of Labor and Employment-Occupation Safety and Health Authority (OSHA)	Are responsible with health and safety aspects of the workers at workplace
Fire Rescue Force	Are responsible with fire safety to buildings users
Ministry of Lands, Housing and Human Settlement Development	These are statutory body with regard to EIA approval process and thus were automatically involved.
Local Government Authorities: Butiama	-These are daily responsible for

District Council staffs and key personnel such as: District Executive Director, District Environmental officer, District Agricultural Officer District Planning Officer/Economist District Community Development Officer District Lawyer, Butiama Ward Executive Officer, Butiama Village Executive Office Surrounding communities	overseeing social economic activities and developmental activities are undertaken in harmony with the community, environment and the legal aspects of the area and the development within their area of jurisdiction.
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### **Typically, the Agenda for the consultations included**

*Presenting the Project:* Obtaining their environmental and socio-economic concerns and perceptions regarding the proposed project which included; land use of the project site, land ownership conflicts, envisaged negative environmental impacts, negative and positive impacts of the project, management aspects of the identified negative impacts, enhancement mechanism of positive impacts and aspects to be considered for sustainable project operations. The method used to get the views of the stakeholders was through professional discussion.

### **5.2 Stakeholders' Concerns**

The study identified main concerns and issues raised by different stakeholders as indicated in the sections hereunder.

#### **5.2.1 Project Acceptance /recommendations**

Consultations with stakeholder were carried out to determine socio-economic aspirations of the locals and also assess the people's perception about the proposed establishment of MJNUAT.

Consultation with local stakeholders indicated that they generally view the proposed project as a positive venture that might stimulate new economic and social development in Butiama District, Musoma Town and Mara region at large. In addition, participants were convinced that the project would not pose irreversible negative impacts on the environment or community in the foreseeable future. Immediate threats of the proposed project to the nearby communities were identified as air pollution and poor handling of liquid and solid waste (Table 5.2).

### 5.2.2. Response of Negative and Positive Impacts

The study provided a wide variety of views and opinions on what are considered to be the main concerns and issues of different stakeholders. The raised concerns were analysed and then given a due weight based on the frequency of issue which was raised. Stakeholders expect that the developer will consider views in the planning and implementation of the project as described in Chapters Seven and Eight.

**Table 24 List of Stakeholders Consulted and their views**

Authority Consulted	Position/Designation	Issue Raised	Response Section
Butiama District Council	District Executive Director	<p>The proposed project has delayed to start.</p> <p>Project implementation will result into economic growth.</p> <p>Cultural changes will happen after the implementation of the project.</p> <p>Positive impacts are highly expected in comparison with the negative impacts.</p> <p>Education on HIV and AIDS should be provided to the local and University communities.</p>	<p>The project is under design and once completed, construction activities will start soon</p> <p>The project is a positive venture towards economic development in Butiama and Mara at large as it will require supply of construction materials, work force and social services for project implementation</p> <p>The contractor is encouraged to hire workforce within Butiama to minimise cultural interferences</p> <p>The project will have more positive socio-economic impacts than negative impacts. Mitigation measures have been proposed to reduce negative impacts and enhance positive environmental and social impacts</p> <p>The contractor shall set aside budget for HIV and AIDS education during construction activities</p>

Authority Consulted	Position/Designation	Issue Raised	Response Section
	District Agricultural Officer	<p>During the implementation of the project mitigation measures should be observed.</p> <p>Solid waste management practices should be observed</p> <p>Positive impacts are highly expected in comparison with the negative impacts.</p>	<p>The contractor shall be supervised during project implementation and commitment in environmental and social protection will be part of bidding documents and his/her contract.</p> <p>The university shall have waste management system taking into consideration that there will be many students in which hygiene needs to be observed</p> <p>The project will have positive impacts to Butiama and the country at large. The project is not expected to cause significant environmental and social impacts as mitigation measures for all impacts have been provided and will be implemented accordingly</p>
Butiama District Council	Planning Officer/Economist	<p>The project will emphasize on economic growth</p> <p>The project will help in growth of population</p> <p>Precaution measures on HIV and other diseases should be taken</p> <p>Project implementation will result into cultural interference</p> <p>Page 93 Project implementation</p>	<p>The university will increase business opportunities in the community and hence more economic activities will emerge</p> <p>The population will lead to pressure on social and infrastructure services and on the other hand will boost the economy around Butiama. Enhancement measures are suggested and incorporated in the project design</p> <p>HIV and AIDS awareness campaign will be conducted throughout project cycle by proponent through</p>

Authority Consulted	Position/Designation	Issue Raised	Response Section
		will result into business growth.	<p>consultant/contractor</p> <p>Construction activities will largely involve local labour while students will stay at University hostels, which will reduce social interactions with the community</p> <p>Business activities are likely to increase since students will need services from the community mainly in terms of food stationaries and entertainment.</p>
Butiama District Council	District Community Development Officer	<p>Mitigation measures should be observed during project implementation</p> <p>Wastewater treatment plants should be constructed for management of wastewater.</p> <p>Precaution measures on HIV prevention and other diseases should be taken</p>	<p>The contractor will be obliged to mitigate environmental and social impacts during the construction phase. This will be part of bidding documents and contract.</p> <p>Treatment plant will be constructed taking into consideration that the university will generate a lot of liquid waste which needs an appropriate treatment plant</p> <p>HIV and AIDS awareness campaign will be conducted throughout the project cycle.</p>
Butiama District Council	District Lawyer	<p>The proposed project will enhance existence of various opportunities to the community.</p> <p>Cultural interference</p>	<p>The project workers will need food, accommodation (In case there will be few rooms at university) and shelter of which is a good news to community around to provide the same</p>



Authority Consulted	Position/Designation	Issue Raised	Response Section
		<p>will occur during project implementation.</p> <p>The community will benefit after the implementation of the project.</p> <p>The proposed project will result into increase in population</p>	<p>Construction activities will involve local labour while students will stay at University hostels thus reducing social interaction with the community</p> <p>The project is designed to benefit first the community</p> <p>The population will increase due to the increase of social interactions among the community and influx of people seeking construction related employment</p>
Fire and Rescue Force	Ag.RFO	The proponent should submit design drawings to Fire and Rescue Office for safety approval prior to request of building permit	The proponent shall inform the consultant to submit the drawings for vetting pertinent to the compliance with fire and safety requirements
Butiama village	Village Executive Officer	<p>The project is accepted.</p> <p>The proposed project will cause population growth.</p> <p>The proposed project will result into economic growth.</p>	<p>This positive for its implementation as it gets local support</p> <p>The population will increase due to the increase of social interactions among the community and influx of people seeking construction related employment.</p> <p>The university will increase business opportunities in the community and hence economic activities will flourish</p>
Butiama Ward	Ward Executive officer	<p>The project is accepted.</p> <p>There will be increase in population after project</p>	<p>Local support is good for project implementation</p> <p>The population will increase due to the increase of social interactions among the community and influx</p>

Authority Consulted	Position/Designation	Issue Raised	Response Section
		<p>implementation.</p> <p>Implementation of the project will help in educational provision to the agriculturalists. Cultural interference will occur during project implementation.</p> <p>The proponent is advised to assist in construction of classes and hostel for Butiama Secondary School.</p>	<p>of people seeking construction related employment.</p> <p>The university will have demo farms that can help the community around to learn modern farming techniques. The University products are expected to provide "state of the art" advisory/extension services to the general public, private sector, as well as the graduands themselves being able to venture into farming, agro-processing, trades and other forms of industrial business.</p> <p>The contractor is encouraged to hire local labor</p> <p>The proponent may improve the learning environment for schools around Butiama and as such academic performance may increase thus making the students qualify to join the MJNUAT.</p>
<p>Technical staff of Mwalimu Julius K. Nyerere University of Agriculture and Technology at Osward Mang'ombe Campus –</p>		<p>Establishment of the university supports the philosophy of Mwalimu J.K. Nyerere who had believed in agriculture as the backbone of the economy for Tanzania.</p> <p>The proposed construction of the University is a long awaited project since 2013 it has been in the</p>	<p>The project shall have impact on agriculture development initiatives in Tanzania</p> <p>The project meets expectations of the university</p> <p>The project shall transform the Butiama community due to opportunities emanating from the project</p>

Authority Consulted	Position/Designation	Issue Raised	Response Section
Butima.		<p>discussion.</p> <p>The project is highly demanded and has positive impacts to Butiama community and National level at large</p>	
Mara Regional Administrative Secretary (RAS) (all heads of units at regional level attended)		<p>The Mwalimu Julius Nyerere University of Agriculture and Technology (MJNUAT) have a big history since its inception in early 2010.</p> <p>Mara Regional Office is in good terms with the staff from MJNUAT, they cooperate with each other in order to make sure that the establishment of the project will not remain in papers but making this dream becomes a reality.</p> <p>RAS offices in collaboration with Butiama District council have helped MJNUAT to acquire the Land Title Deed for the proposed project.</p> <p>RAS office is aware about the social services and infrastructure development needed</p>	<p>Positive</p> <p>The dream has come true</p> <p>Positive</p> <p>The social services shall be in place to run the university</p> <p>The dream has come true for the project to materialize</p>

Authority Consulted	Position/Designation	Issue Raised	Response Section
		<p>to support the project e.g., water supply and roads and is prepared to support the implementation.</p> <p>The people of Mara Region have high expectations to see the first public university to be established at Butiama.</p>	
TANESCO		<p>Advised the MJNUAT to put power house</p> <p>MJNUAT should supply estimated energy consumption</p>	<p>It will be part of the project implementation</p> <p>The power demand shall be established before applying for the additional power supply</p>

## CHAPTER SIX

### 6.0 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF ALTERNATIVES

#### 6.1 Introduction

UNDP (2002) EIA training resource manual pages 152-179 provides guidance on impact identification, prediction and evaluation. This framework has to a high extent used to identify, predict and evaluate impacts of the proposed project in each stage of the proposed project. The proposed enhancement and mitigation measures are outlined in chapter seven of which MoEST through MNJUAT is committed to undertake to prevent, eliminate 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 the World Bank Environmental Standards (ESS), ESMF, 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; (iii) negative economic and social impacts relating to the involuntary taking of land or restrictions on land use, and (iv) impact related to pressure to accessing social services such as education, health and water.

## **6.2 Impact Identification**

Impact identification is a process designed to ensure that all potential significant impacts are identified and taken into account 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 ESIA, 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 preparatory and demolition phase**

The following issues were identified to be occurring during the preparatory and demolition phase of the project.

#### *Positive social impacts*

- i. Job Creation and Increased Income to Local Communities

#### *Negative social impacts*

- I. Land acquisition and population displacement
- II. Disruption of economic and social activities and services

#### *Negative environmental impacts*

- I. Exploitation of borrow pits/quarries and other natural resources

- II. Contamination and /impaired quality of receiving body – land and water
- III. Disadvantages related to the management of solid wastes from demolition activities

### **6.2.2 Impacts associated with construction phase**

The following issues were identified to be occurring during the construction phase of the project.

#### Positive social impacts

- i. Jobs creation
- ii. Income to local suppliers and service providers
- iii. Skills acquisition

#### Negative social impacts

- I. Occupational Safety and Health impacts
- II. Community Health, Safety and Security
- III. Gender based violence
- IV. Gender discrimination
- V. Child labor
- VI. Cultural change due influx of people and rapid population
- VII. Spread of communicable diseases such HIV/AIDS, CoVID 19, Hepatitis B etc.
- VIII. Pressure on social services such education, health, water, electricity etc
- IX. Violation of workers rights
- X. Increased security

#### Negative Environmental Impacts

- I. Impacts on air quality
- II. Noise Impacts
- III. Impacts of vibration
- IV. Wastewater Management problems
- V. Solid waste management problems
- VI. Erosion of Exposed Surfaces
- VII. Landscape and visual impacts
- VIII. Loss of vegetation

### **6.2.3 Impacts associated with Operation Phase**

The following issues were identified to be occurring during the operation phase of the project.

Positive social impacts

- I. Increase of admission of students to universities and colleges
- II. Increase of revenue to academic institutions
- III. Job creation
- IV. Increased commercial and social activities around project locations
- V. Production of skilled labor force for implementing various development policies, plans and goals for sustainable social and economic growth of the Nation

Negative social impacts

- I. Increased incidences of diseases and ill health
- II. Increased pressure on social services and utilities

Negative Environmental impacts

- I. Water pollution
- II. Storm water generation and overflow
- III. Health and safety risks due to fire hazards

**6.2.4 Impacts associated with Decommissioning Phase**

The following key issues are associated with decommissioning phase:

Negative social impacts

- i. Loss of employment and revenues

Negative environmental impacts

- I. Loss of aesthetic value due to haphazard disposal of demolished waste
- II. Dust and noise pollution from demolishing works
- III. Loss of revenue to institutions and the government

**Impact Prediction**

Analysis and prediction of impacts drew on the baseline data on physical, biological, socio-economic, anthropogenic data and techniques; environmental standards; value judgement and professional experience. A range of methods and techniques may be used as shown below.

**Nature: negative or positive; direct or indirect; short term or long term; temporal or permanent.**

- I. Magnitude: severe, moderate, low
- II. Extent: Location, area, volume covered or distribution

- III. Timing: during mobilisation, construction, operation, decommissioning, delayed, rate of change
- IV. Duration: short-term, long term, intermediate, continuous
- V. Reversible or irreversible
- VI. Likelihood: probability of occurrence, uncertain
- VII. Significance; local, regional or global

### 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 16). 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. Extent over space and time i.e whether the impact is extensive in concentration or in relation to assimilative capacity
- ii. Exceed or approximate to environmental standards or threshold
- iii. Do not comply with the environmental, land use plans, sustainability strategies
- iv. Affect ecologically sensitive areas and heritage resources
- v. Affect community lifestyle, traditional land use and values.
- vi. Degree of recovery of the affected environment;
- vii. The value of the affected environment;
- viii. The level of public concern
- ix. Level of adversity and seriousness in affecting ecologically sensitive areas;

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 16 describes the ratings used in the Simple Matrix as far as spatial scale is concerned

**Table 25 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 17 describes the ratings used in the Simple Matrix.

**Table 26 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 are impacts that cause changes to the environment that are caused by an action in combination with other past, present and future human actions.
- **Residual Impacts-** These are long term impacts, which go beyond the lifetime of the project.

**Table 27 Impact Correlation Matrix for the proposed construction of MJNUAT**

S/ N	Impact	Project activities and phase														Impact Criteria		Rating			
		Preparation/Construction					Operation Phase						Demobilization phase								
		Site clearance	Transportation of materials	Trench excavations and casting of	Construction of the superstructure and	Landscape activities	Running academic programs, research and consultancies	Liquid waste	Solid waste handling	Energy provision	Maintenance works	Presence of Auxiliary facility and Boundary	Water provision	Removal of temporary Structure	Landscaping	Termination of Temporary	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
	<b>Positive Socio-economic impacts</b>																				
1	Benefits to communities resulting from employment/jobs	+1	+1	+2	+3	+1	+2	+1	+1	+1	+2	+2	+1	+1	+1	0	L	ST	R	✓	
2.	Availability of adequate academic facilities	0	0	0	0	0	+3	0	0	0	0	0	0	0	0	0	N	MT	I R		✓

S/ N	Impact	Project activities and phase															Impact Criteria		Rating		
		Preparation/Constructio n					Operation Phase							Demobilizat ion phase							
		Site clearance	Transportation of materials	Trench excavations and casting of	Construction of the superstructure and	Landscape activities	Running academic programs, research and consultancies	Liquid waste	Solid waste handling	Energy provision	Maintenance works	Presence of Auxiliary facility and Boundary	Water provision	Removal of temporary Structure	Landscaping	Termination of Temporary	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
3.	Impacts on e Skills	0	0	0	+2	0	+3	0	0	0	1	0	0	0	0	0	L	LT	I R		✓
4	Workers rights violation	-1	-1	-1	-3	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	✓	
4.	Increase of admission of students to universities and colleges	0	0	0	0	0	+3	0	0	0	0	0	0	0	0	0	N	MT	R	✓	

S/ N	Impact	Project activities and phase														Impact Criteria		Rating			
		Preparation/Construction					Operation Phase						Demobilization phase								
		Site clearance	Transportation of materials	Trench excavations and casting of	Construction of the superstructure and	Landscape activities	Running academic programs, research and consultancies	Liquid waste	Solid waste handling	Energy provision	Maintenance works	Presence of Auxiliary facility and Boundary	Water provision	Removal of temporary Structure	Landscaping	Termination of Temporary	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
5.	Increased commercial and social activities around project locations.	0	0	0	0	0	+3	0	0	0	0	0	0	0	0	0	L	MT	R	✓	
6.	Production of staff and students in STEM	0	0	0	0	0	+3	0	0	0	0	0	0	0	0	0	N	LT	I R		
7	Access to extension services and agro-processing and value addition techniques	0	0	0	0	0	+3	0	0	0	0	0	0	0	0	0	N	LT	I R	✓	

S/ N	Impact	Project activities and phase															Impact Criteria		Rating		
		Preparation/Constructio n					Operation Phase							Demobilizat ion phase							
		Site clearance	Transportation of materials	Trench excavations and casting of	Construction of the superstructure and	Landscape activities	Running academic programs, research and consultancies	Liquid waste	Solid waste handling	Energy provision	Maintenance works	Presence of Auxiliary facility and Boundary	Water provision	Removal of Temporary Structure	Landscaping	Termination of Temporary	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
	<b>Negative socio-economic impacts</b>																				
8.	Risk on community Health, Safety and Security	0	0	0	-2	0	-1	-1	-1	0	0	0	0	-1	0	0	L	MT	R		
9.	Gender Based Violence	0	0	0	-2	0	0	0	0	0	0	0	0	0	0	0	L	MT	R		
10.	Gender Discrimination	0	0	0	-2	0	0	0	0	0	0	0	0	0	0	0	L	ST	R		
11.	Child Labor	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	L	MT	R		

S/ N	Impact	Project activities and phase															Impact Criteria		Rating		
		Preparation/Constructio n					Operation Phase							Demobilizat ion phase							
		Site clearance	Transportation of materials	Trench excavations and casting of	Construction of the superstructure and	Landscape activities	Running academic programs, research and consultancies	Liquid waste	Solid waste handling	Energy provision	Maintenance works	Presence of Auxiliary facility and Boundary	Water provision	Removal of Temporary Structure	Landscaping	Termination of Temporary	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
12.	Land acquisition and population displacement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	L	ST	I R		
13.	Disruption of economic and social activities and services	0	0	0	0	0	-2	0	0	0	0	0	0	0	0	0	L	ST	I R		
14	Exploitation of borrow pits/quarries and other natural resources	0	0	0	-2	0	0	0	0	0	0	0	0	0	0	0	L	ST	R	✓	

S/ N	Impact	Project activities and phase															Impact Criteria		Rating		
		Preparation/Construction					Operation Phase						Demobilization phase								
		Site clearance	Transportation of materials	Trench excavations and casting of	Construction of the superstructure and	Landscape activities	Running academic programs, research and consultancies	Liquid waste	Solid waste handling	Energy provision	Maintenance works	Presence of Auxiliary facility and Boundary	Water provision	Removal of temporary Structure	Landscaping	Termination of Temporary	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
15.	Water Pollution		-1	-1	-1	0	0	0	0	0	0	0	0	0	0	0	R	ST	I R		
16.	Solid Waste Management Problems	-2	0	0	-2	0	-2	0	-2	0	0	0	0	0	0	0	L	ST	I R		
17.	Dust pollution	-2	-2	-2	-2	-1	-1	0	0	0	-1	-1	0	-2	-1	0	L	ST	R		
18	Noise pollution	-2	-2	-2	-2	-1	-1	0	0	0	-1	-1	0	-2	-1	0	L	ST	R		



S/ N	Impact	Project activities and phase															Impact Criteria		Rating		
		Preparation/Construction					Operation Phase					Demobilization phase									
		Site clearance	Transportation of materials	Trench excavations and casting of	Construction of the superstructure and	Landscape activities	Running academic programs, research and consultancies	Liquid waste	Solid waste handling	Energy provision	Maintenance works	Presence of Auxiliary facility and Boundary	Water provision	Removal of temporary Structure	Landscaping	Termination of Temporary	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
19.	Wastewater Management Problems	-1	0	-1	-3	-1	-3	-2	0	0	-1	-1	0	-1	-1	0	L	ST	R	✓	
20.	Occupation Safety and Health Impacts	-1	-1	-2	-3	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	0	L	MT	R		
21.	Cultural change due population influx and rapid growth	0	0	-1	-2	0	-2	0	0	0	-1	0	0	0	0	0	L	MT	R	✓	✓
22.	Loss of vegetation	-2	0	-1	-2	-1	0	0	0	0	0	0	0	0	0	0	L	ST	I R		

S/ N	Impact	Project activities and phase															Impact Criteria		Rating		
		Preparation/Constructio n					Operation Phase							Demobilizat ion phase							
		Site clearance	Transportation of materials	Trench excavations and casting of	Construction of the superstructure and	Landscape activities	Running academic programs, research and consultancies	Liquid waste	Solid waste handling	Energy provision	Maintenance works	Presence of Auxiliary facility and Boundary	Water provision	Removal of Temporary Structure	Landscaping	Termination of Temporary	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
23.	Construction vibration	-1	-1	-1	-2	-1	0	0	0	0	0	0	0	0	0	0	L	ST	I R		
24.	Increased revenue to academic institutions	0	0	0	+1	0	+3	0	0	0	0	0	0	0	0	0	N	LT	R	✓	
25.	Income to local suppliers and service providers	0	0	0	1	0		0	0	0	1	0	0	0	0	0	L	MT	R		✓
26.	Increased pressure on social services and utilities	0	0	-1	-1	0	-3	-3	-3	-3	-1	-2	-3	0	0	0	L	MT	R	✓	

S/ N	Impact	Project activities and phase														Impact Criteria		Rating			
		Preparation/Constructio n					Operation Phase						Demobilizat ion phase								
		Site clearance	Transportation of materials	Trench excavations and casting of	Construction of the superstructure and	Landscape activities	Running academic programs, research and consultancies	Liquid waste	Solid waste handling	Energy provision	Maintenance works	Presence of Auxiliary facility and Boundary	Water provision	Removal of Temporary Structure	Landscaping	Termination of Temporary	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
27.	Health and safety risks due to fire hazards	0	0	0	0	0	-2	0	0	-2	0	0	0	0	0	0	L	MT	R		
28.	Increase Incidence of Diseases and Ill Health	0	0	0	-2	0	-2	0	0	0	0	0	0	0	0	0	L	MT	R		
29.	Erosion of Exposed Surfaces	-2	0	-1	-2	-1	0	0	0	0	0	0	0	0	0	0	L	MT	R		
30.	Landscape and Visual impacts	-1	0	-1	-2	0	0	0	0	0	0	0	0	0	0	0	L	MT	R		

S/ N	Impact	Project activities and phase															Impact Criteria		Rating		
		Preparation/Construction					Operation Phase					Demobilization phase									
		Site clearance	Transportation of materials	Trench excavations and casting of	Construction of the superstructure and	Landscape activities	Running academic programs, research and consultancies	Liquid waste	Solid waste handling	Energy provision	Maintenance works	Presence of Auxiliary facility and Boundary	Water provision	Removal of temporary structure	Landscaping	Termination of Temporary	Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact
31.	Storm water generation and overflow	0	0	0	0	0	-2	0	0	0	0	0	0	0	0	0	L	MT	R		

## **6.5 Potential Environmental and Social Impacts during the Preparatory/Mobilisation Phase (Site Selection and Design)**

### **Positive social impacts**

#### **6.5.1 Job Creation and Increased Income to Local Communities**

During this phase people will be employed by the contractors to do mobilization works such as construction of campsites, quarrying and material extraction and transportation activities etc. This opportunity will certainly increase income to the employed people.

- Employment impact this phase is moderate, localized and short term.
- It is direct as employed people will benefit directly by earning wages and/or salaries.
- It is also indirect due to the existence of the project other people will get earnings through supplying goods and services to the project area such as food vendors, transporters, money transactions and so forth.
- The project has inductive impact-other economic activities will emerge in the locality using income earned directly or indirectly project activities.
- It is also cumulative in that many people will start putting up their businesses to complement HEET project e.g construction of residual houses, establishment of restaurants for the forthcoming employees and students, all these will generate employment.

### **Negative social Impacts**

#### **6.5.2 Land acquisition and population displacement**

There was no land acquisition in the project area. As the land was already a Government owned property by the then Butiama Artificial Insemination Centre.

- The impact is direct as the compensation was made direct to the immediate relatives of the diseased.

#### **6.5.3 Exploitation of borrow pits/quarries and other natural resources**

Contractors will use different sources of construction material in the district in and region. This includes extraction of stones, sand or other construction materials from quarry area (s).

- This impact is direct as it will affect the area with permanent holes.
- It may also lead to indirect impacts by creating soil erosion.

- In addition, it could be cumulative if other projects will use the same location to extract soils and concrete.
- It is inducive in that if the quarries retain water, they may pose a danger to many people through building up of undesirable pests (mainly mosquitoes and flies), and waterborne diseases such as cholera and typhoid.

#### **6.5.4 Contamination and /or impaired quality of receiving body – land and water.**

There are typically three sources of pollution from construction phase which can impact on water sources: silt pollution; the release of hydrocarbons or chemicals; and the release of other site waste into the water such as litter, oil leakages or building materials.

- This impact is direct to the human health such as diarrhoeas, dysentery and other abdominal related diseases
- It is indirect as it may increase cost of health care for the affected persons.
- It is inducive as people may start looking for other clean water sources for consumption.
- The impact is also likely to be cumulative because of other activities in the area such as nearby other construction by individuals adjacent to the project.

#### **6.5.5 Solid wastes generation:**

Construction and demolition waste may include packaging material and land-clearing debris, wood, steel, concrete, gypsum, masonry, plaster, metal, and asphalt

This impact is direct impact in that the receiver body will be affected.

Indirect is may become abbreeding mediuam of pathogens such as bacteria.

Indirect impact as it can attract scavengers e.g Cape vulture

Cumulative in that waste will also be generated from other construction going on in the location.

### **6.5.6 Disadvantages related to the management of solid wastes from demolition activities**

The dilapidated buildings at the site will need to be demolished to pave way to construction activities. A lot of waste is expected to be generated as a result of activity. These shall include blocks, concrete; scrap metals, asbestos materials, remnant of timbers, and domestic waste from construction crews, reinforcements, pipes etc. The wastes may contaminate land or be washed into local surface and ground water resources and impair the quality of these receiving bodies. Asbestos pose a grave danger to public health as it is a proven carcinogenic, which needs to be handled carefully to avoid spread of its fibres in the environment during the demolition exercise. This impact is moderate, localized and will be short term.

- This impact is direct as the receiver body will be affected outright.
- It is also indirect as it can attract scavengers e.g Cape vulture
- It is inducive because if not properly treated could lead to spread of the diseases.
- It is cumulative in that waste could also be generated from other construction work in the location.

## **6.6 Potential environmental and social impacts during construction phase**

### **Positive social impacts**

#### **6.6.1 Jobs creation**

During this phase people will be employed by the contractors to do mobilization works such as construction of campsites, quarrying and material extraction and transportation activities etc. This will increase income to the employed people.

- This impact is high, extensive and medium term.
- It is direct in that the employed people will benefit by directly earning wages and/or salaries.
- It is also indirect in that due to the existence of the project other people will get earnings through supplying of goods and services to the project area such as food vendors, transporters, money transactions and so forth.
- The project will induce other economic activities by using income earned directly or indirectly HEET Project.
- It is also cumulative in that many people will start putting their project to complement the HEET project e.g construction of residential houses,

establishment of restaurants for the forthcoming employee and students all these will generate employment for skilled and nonskilled.

### **6.6.2 Income to local suppliers and service providers**

The presence of the University (construction and operation stages) will expand the market for the local produce, promote businesses in the area with implication of value addition and increase of cash flow (increase of prices).

- The impact is indirect and induced as people will be earning incomes due to the provision of goods and services as a result of the existence of HEET project. Thus the project existence has induced other businesses. In the long-term, the facilities could be turned used as school, an upgraded health clinic and better facilities for local village administration.
- It is cumulative in that due to improved access to the area, this will increasing wealth in the project area through improved transport and increased mobility of the local population, increased trade. Also senior construction contract staff will require people to help with domestic work such as house boys or housemaid. This will create job opportunities. [1]  
[SEP]

### **6.6.3 Impacts on Knowledge**

Butiama is a small township and may not have sufficient skilled technical persons to construct concrete structures, installation of electrical wiring system etc. In addition, the equipment and technology might be new to most practicing local engineers and consultants. The project activities will therefore benefit local experts in updating their knowledge and have opportunity to learn using of advanced construction technologies, which could be applied even after the project closure.

- This impact is direct for the employees through on job trainings.
- It is also indirect as by using the acquired knowledge could lead to getting employment elsewhere.
- Furthermore, impact on knowledge is inducive as through it, other economic ventures can be realized.
- It is cumulative in that the on job training have cumulative impact on livelihoods for the employee and their families and dependents.



## **Potential negative social impacts**

### **6.6.4 Occupational Safety and Health impacts**

On a daily basis, construction workers face some of the most perilous employment conditions. Even though construction workers are trained and know basic safety measures, accidents can still happen. The risks taken every day during regular construction work pose risk of accidents. Accidents can result in serious injuries or death. There is potential significance of the risk to health and public safety will depend on the size of the workers population and the workers exposed and the degree of exposure.

- It is direct as the affected people could get permanent damage, increase medical health expenses
- it is indirect as affected people could also affect their families livelihoods
- It is inducive may affect family development such as paying fees for children.
- It is cumulative in that if there will be no safety measures many injuries will occur at the workplace. This reduces productivity and work force for the project.

**Table 28 Sources of the harmful effects on health and safety**

<b>Type of harmful effect</b>	<b>Sources of the threat</b>
Accident risk	<ul style="list-style-type: none"> <li>• During excavation work</li> <li>• Movements and operations of heavy equipment</li> <li>• Access to danger zones</li> <li>• Transport, handling and storage of the materials</li> <li>• Concrete batching and mixing plant</li> </ul>
Indirect health risk	<ul style="list-style-type: none"> <li>• Environmental pollution</li> <li>• Contamination of water or/and food</li> </ul>

### **6.6.5 Increased accidents**

Increased incidence of road accidents, during the construction phase, and from occupational hazards as result of poor instruction and/ or awareness on safety regulations, ignorance of warnings and reckless personnel, and disregard for safety gear.

- The impact is direct to the affected people interms of illness, disability or

- even death,
- Indirect impact as injured people will reduce manpower and increase costs for health care. Also the affected people could lead to reduced wellbeing of their families.
- Induced in that traffic cases may arise due to accidents
- Cumulatively, uncontrolled many accidents could affect a large population in the area.

#### **6.6.6 Gender based violence (GBV)**

According to the existing social cultural relationship in Mara Region there is a possibility of experiencing gender based violence at the project area. In Mara region gender inequality is one of the most notable human rights violations. Both women and men experience gender-based violence but the evidence is more pronounced in latter than the former. This impact is moderate, localized and will be medium term.

- The GBV impact is direct to the affected pers through physical harm to lasting psychological trauma, and even death.
- It is also indirect impact due to the lost productivity of the abused
- Induced impact of GBV could be abusive character of the affected persons.
- Cumulative impact of GBV in the society could be a long-term emotional distress to fatalities. Unwanted pregnancies, complications during pregnancy and birth, and STIs, including HIV.

#### **6.6.7 Gender discrimination**

The proposed project may cause biasness employment to favor men. This might lead into more project benefits to men than women. Tanzania regulations encourage equal opportunities for all regardless of sex. This impact is moderate, localized and will be medium term.

- The impact is both direct in that it affects individuals directly,
- indirect in that it could lead to someone losing his/her job opportunity because of gender discrimination and;
- cumulative in that many women could lose opportunities because of gender discrimination which will affect their families livelihoods..

#### **6.6.8 Child labor**

There is a risk that some project-related activities could employ children thereby depriving children their childhood preveledge and it is mentally, physically, socially or morally dangerous and harmful.

Direct impact. It can lead to slavery and sexual or economic exploitation and cuts children off from schooling and health care, restricting their fundamental rights.

- Indirect it can reduce market wages and may leave the economy at a low level equilibrium with a large supply of low skilled (child) labor, low wages and low education levels,
- Induced impact as it deprives opportunities of children to enjoy their childhoods and increased poverty in the society.
- Cumulative impacts will occur by having large number of illiterate/low education children in the project surrounding communities.

The Labour Management Plan/procedure may need to be provided that no one under the age of 18 may be employed or engaged in connection with the project. This impact is moderate, localized and will be short term.

## **6.7 Impacts on physical environment**

### **6.7.1 Impacts on air quality**

Construction activities have potential to emit dusts and noxious gases such as CO<sub>2</sub>, CO, NO<sub>x</sub>, SO<sub>2</sub>, VOC and CH<sub>4</sub>. Vehicles and equipment with internal combustion engines have potential to emit noxious gases. Construction works that are likely to generate dusts are mainly related to the movement of materials and machinery and construction work. When dust is exceptionally fine and the residents are exposed persistently and for a long period of time public health will be at a risk. Potential sources of dust at the site and off site are summarized in Table 20 This impact is moderate, localized and will be long term.

**Table 29 Project activities and Impa**

<b>Activity</b>	<b>Source of production of dust</b>
<b>On-site building work producing dust and gaseous emissions</b>	
<b>Clearance and terracing of the site</b>	Earthworks Initial soil spreading after excavation. The movement of construction traffic and movement of materials Stored materials subjected to wind action
<b>Excavation</b>	The important sources are: <ol style="list-style-type: none"> <li>Movement of traffic of construction</li> <li>Handling and storage of waste</li> <li>Excavation and transport of materials and on site storage</li> </ol>
<b>Building</b>	The important sources are:

<b>Foundations</b>	<ul style="list-style-type: none"> <li>i. Foundation excavation</li> <li>ii. Movement of construction traffic</li> <li>iii. Handling and the storage of waste</li> <li>iv. Excavation and transport of materials and on site storage</li> </ul>
<b>Building Works</b>	<p>Movement of traffic of construction vehicles. Potential of a certain strongly localized harmful effect like dust inhalation if the completion of work requires "smoothing and sanding" of the wall to obtain a desirable completion.</p>
<b>Auxiliary work -</b>	
<b>Off-site building work producing dust</b>	
<b>Main court</b>	<p>Any movement of traffic on unpaved roads Surface materials brought by the wind</p>
<b>Aggregate mixing unit</b>	<p>Stored materials Filtering and other methods for processing construction materials Handling of materials (loading output) Traffic congestion</p>
<b>Tool maintenance course</b>	<p>Materials on the surface brought by the wind Traffic of construction</p>
<b>Sites for borrow materials</b>	<p>Clearing the site Excavation Stored materials Material loading</p>

With regard to the gaseous emissions, sources of atmospheric emissions associated with construction activities are mainly units of construction and electricity generators, by evaluating these sources, the following can be inferred:

- i. The majority of the sources are mobile and will generate dispersed emissions and in a temporary way;
- ii. The majority of the emissions will be generated starting from the concentrations of activities which are rather far away from the sensitive receivers; and
- iii. The level of the emissions of the precursory pollutants and the atmospheric pollutants will vary from day to day, according to the type of activity done. However, even if the impact is very limited in time, it does

not remain the same as it is subjected to a factor of expansion in space depending on the weather conditions. Of this fact the intensity of the impact of the building site on air pollution especially by the suspended particles is evaluated to be average.

- Direct workers may experience health problems such as colds, headaches, drowsiness, irritation, and irregular breathing
- Indirect t may occur from transfer and subsequent contact with other affected people.1
- Induced impact is the reduced productivity of the work force which could also affect family wellbeing
- Cumulatively many project nearby the project could lead to more people impacted which eventually will translate into reduce productivity and high health costs.

### **6.7.2 Noise Impacts**

During construction works, noises come mainly from construction machines (power picks, mechanical shovels, cranes, concrete batching and mixing plant, etc.), construction vehicles for transporting materials as well as use of explosives for breaking massive rocks. The extent of the nuisance will depend on the spatial organization of the site and mainly the location of borrow pits, as well as the crushing plant, concrete mixers and other noisy machines compared to inhabited areas. This impact is moderate, localized and will be short term.

- Direct impact could be hearing impairment and permanent loss of hearing. Prolonged exposure to loud noise levels can cause high blood pressure, heart disease, sleep disturbances, and stress
- Induced impact is the reduced productivity of the work force which could also affect family wellbeing
- Cumulatively many project nearby the project could lead to more people impacted which eventually will translate into reduce productivity and high health costs.

### **6.7.3 Impacts of 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 are blasting and impact pile driving for foundation. Due to an increase in activities and number of operational vehicles, the impacts of vibration include causing disturbance to neighbors and physical

damage to properties near the construction site. This impact is moderate, localized and will be short term.

- Direct impact is damage to the nerves and blood vessels
- Indirect impact could be cracking of walls within and neighboring community buildings
- Induced impact could be increased cost of construction.
- Cumulative impact can occur due to similar impact on the adjacent construction going on.

**6.7.4 Wastewater Management problems**

Wastewater will be generated during construction activities include sewage, grey water and process water. Also sewage effluent will be produced in the sanitary facilities and will be collected on site. Table 21 displays source of waste water.

**Table 30** Types and sources of waste water

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

- This impact is direct to the human health such as diarrhoeas, dysentery and other abdominal related diseases and increase cost of health care to the affected persons.
- It is inducive as people may be forced to look for other sources of clean water.
- The impact is also likely to be cumulative because of other activities in the area such as nearby constructions.

### 6.7.5 Solid waste management problems

Main sources of construction waste will come from vegetation clearing and top soil (overburden), scrap metals, remnant of timbers and domestic waste from construction crews. Other sources will be from cafeteria and offices. The waste may contaminate land, surface and ground water resources and impair the quality of these receiving bodies. Other associated impacts include flies and increased bird population (attracted by food waste). This impact is high, localized and will be short term.

- This impact is direct in that the receiver body will be affected.
- It is also indirect impact as it can attract scavengers e.g Cape vulture
- Cumulatively, the waste could increase because of construction activities by other developers apart from HEET Project.

### 6.7.6 Erosion of Exposed Surfaces

Soil erosion is likely to occur due to clearance of vegetation, hard surfacing and channeling of floodwater. This may lead into increased flooding and gully erosion in adjacent land. Soil erosion may also be caused by poor design and inadequate placement of culverts or from earth-moving activities at construction sites and cuttings on hill slopes.

- Direct impact is the reduced soil fertility, which can negatively affect crop yields. It may also cause siltation downstream, which can create heavy layers of sediment that prevent streams and rivers from flowing smoothly.
- Indirectly can lead to flooding due to sediment deposition.
- Inductive impact is reduced productivity due to siltation [SEP] which reduces water availability for other uses including farming.
- Cumulative will occur in terms of steady decline in soil fertility which may demand supplementary agrochemicals thereby increasing cost of production. [SEP]

### 6.7.7 Landscape and visual impacts

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, color views as well as sounds

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

- The impact is short term and direct.

### **6.7.8 Loss of vegetation**

Much of the natural vegetation in the project area is characterized by grass and scattered woodlands together with bushes and shrubs. There are also natural and manmade forests. Other natural vegetation can only be seen in Ikolokomyo hill. They also occur in areas abandoned by farmers where natural regeneration takes place. Overall the clearance of the plants will have significant impacts on ecology of the site and the nearby surroundings.

Exposed area as a result of vegetation clearance are likely to be exposed to the agents of soil erosion especially wind and water. Clearance of vegetation—especially bulldozing to ground level has a tendency to damage local vegetation cover and potentially damage/ loss of habitats and local biodiversity and increase risks to erosion. Permanent clearance will be confined only to project site. This impact is local and will be of medium term.

- Direct impact is destroy of biodiversity and fragments habitats, increases soil erosion, contributes to pollution, increases flooding risk
- Indirect will increase cost of production and maintenance of the university.
- Induced impact is the possibility of exacerbates climate change effect.
- If uncontrolled cumulatively will lead to low productivity of the area due to eroded nutrients.



## 6.8 POTENTIAL IMPACTS DURING THE OPERATION PHASE

### *Potential Positive Social Impacts*

#### **6.8.1 Increase admission of students to universities and colleges**

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

- Direct impact is the increased number of skilled staff in STEM and income to the graduates
- Indirect is for the society to derive benefits from having an educated citizenry.
- Inductive impact is that by graduating in STEM more job and income generating opportunities may emerge including self employment.
- Cumulatively, the nation will increase number of STEM experts in the country.

#### **6.8.2 Increase of revenue to academic institutions**

MJNUAT will increase students' enrolment, which in return will increase revenues through university fees. This will increase the University financial muscles for running the university. It will also be one of the Government source of incomes. This impact is high, extensive and long term. The project will also provide employment opportunities for many people skilled and unskilled.

- It is direct in that the employed people will benefit directly from the project by earning wages and/or salaries.
- It is also indirect in that due to the existence of the project other people will get earnings through supplying of goods and services to the project area such as food vendors, transporters, money transactions and so forth.
- The project will induce other economic activities by using income earned directly or indirectly to establish other businesses or from own sources.
- It is also cumulative in that many people will start putting their project to complement the HEET project e.g construction of residual houses, establishment of restaurants for the forthcoming employee and students all these will generate employment.

### **6.8.3 Job creation**

Jobs to be created during the operation phase of the project can be divided into two (2) categories: direct and indirect jobs. Direct jobs are those related to employment as casual laborers and skilled manpower, operational services, teaching,. Indirect jobs are those created by the positive impacts of the institution to economic sectors. These include cleanliness, stationeries, catering and commercial activities. In addition, indirect jobs will include agriculture, livestock, energy and water sector. This impact is high, extensive and long term.

- It is direct in that the employed people will benefit directly by earning wages and/or salaries.
- It is also indirect in that due to the existence of the project other people will get earnings through supplying of goods and services to the project area such as food venders, transporters, money transactions and so forth.
- The project will induce other economic activities by using income earned directly or indirectly to establish other businesses or by supplying things to the university.
- It is also cumulative in that many people will start putting their project to complement the HEET project e.g construction of residual houses, establishment of restaurants for the forthcoming employee and students all these will generate employment.

### **6.8.4 Increased commercial and social activities around project locations**

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

- The impact is indirect and induced as people will be earning incomes due to the provision of goods and services. Thus the project existence has induced opportunity for other businesses.
- It is cumulative in that due to the mproved access to the area, this will increasing wealth within the benefited communities Also senior employed staff will require people to help with domestic work. This will create jobs and opportunities to develop small businesses. [L]  
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### **6.8.5 Production of skilled labor**

The proposed MJNUAT project will contribute to FYDP II through generation of skilled labor to support industrialization and increasing youth participation in business such as agriculture, fisheries, agro-processing, agribusiness, renewable energy utilization and trade thereby reducing unemployment in the country. Thus contributing to the Tanzania economy through generation of quality graduates that are relevant to the labor market requirements.

- This impact is direct for the employees through trainings in priority disciplines.
- It is also indirect as by using the acquired knowledge could lead to getting employment elsewhere.
- Further impact on knowledge is inducive as through it, other economic ventures can be realized.
- It is cumulative in that graduate from MJNUAT will complement other graduates national wide.

### **Negative Social Impacts**

#### **6.8.6 Increased incidences of diseases and ill health**

The concentration of a large number of people within the proposed project area could contribute to increased risk of spread of communicable diseases such as Sexually Transmitted Diseases (STDs), HIV/AIDS, COVID-19, TB and other ailments due to interaction and concentration of people from various places. This impact is medium, extensive and long term.

- Direct impact is the illness of the affected people.
- Indirectly is the increased cost of health services and reduced livelihood to the family
- Indirect impact will be reduced manpower/work force at the work place
- Induced reduced capacity to serve familiy and dependants due to illness
- Cumulative due to the possibility of high spread e.g TB to many people.

#### **6.8.7 Increased pressure on social services and utilities**

The University has the potential to increase pressure on the existing social services and utilities such as education, health and water. The increase of population due to employment opportunities and students enrolment will definitely strain the existing social services. This impact is high, local and will be medium term.

- Direct impact is poor access to education, health and water facilities  
Congested of students in classes, congested of patients in health facilities and inadequate access to clean water
- Indirect impact poor quality of education, health services and water which may lead low human capital and diseases especially communicable.
- Induced impact is the exacerbated poverty in the surrounding communities
- Cumulatively poor living standards of the nation

### ***Impacts on physical environment***

#### **6.8.8 Water pollution**

Water pollution will mainly occur if sanitation systems used during project operation will be inadequate. The proposed project will increase the number of people. Onsite sanitation systems always cause groundwater pollution due to infiltration of the effluent during disposal. Also, surface water is at risk of pollution due to drainage of contaminated impervious surfaces. In this case, the main pollutants include solid matters, floating and macro waste, chemicals from laboratories and training workshops and organic matters. During the rainy season, the surface waters will drain the pollutants directly towards the natural discharge system if the project does not envisage pre-treatment of rain water.. If not addressed this impact is high, extensive and long term.

- This impact is direct to the human health such as diarrhoeas, dysentery and other abdominal related diseases and increase cost of health care to the affected persons.
- It is inducive as people may start looking for other clean water sources for consumption.
- The impact is also likely to be cumulative because of other activities in the area such nearby other construction by individuals adjacent to the project.

#### **6.8.9 Storm water generation and overflow**

The proposed project components cause generates a large amount of storm water due to the presence of pavements, concrete surfaces and building roofs. The structures may compromise the infiltration capacity of the land surface hence causing surface runoff to increase. Storm water generation will be aggravated by location of the site at the bottom of Ikolokomyo hill. The presence of the hill will result into flash floods at the University campus. The storm water generated might have impacts on structures downstream as well as being a

causative factor for soil erosion and poor water quality. This impact is moderate, local and will be medium term.

- Stormwater direct of greatest concern are sediment and habitat alteration, toxic substances, bacteria, oxygen-demanding substances, and biological integrity.
- Cumulatively, runoff picks up oil, pesticides, dirt, bacteria and other pollutants as it makes its way through storm drains and ditches - untreated - to the down streams, rivers, lakes and the ocean thus directly polluting them.
- Indirect impact of stormwater, or floodwater, can kill people or animals, and can destroy buildings, roads or crops.

#### **6.8.10 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:

- Direct impact of death from the toxic gases, thick smoke and lack of oxygen and loss of properties
- Another direct it will lead to permeant health damage/disability
- Indirect impact could be poverty

#### **Accidents and Serious Injuries;**

- The impact is direct to the affected people interms of illness, disability or even death,
- Indirect due to the lost manpower and increased health cost .Also affected people could affect wellbeing of their families.
- Induced impact could involve issues like traffic cases due to accidents
- Cumulatively, uncontrolled many accidents could affect a large population in the area.

## **6.9 impacts during decommissioning phase**

### **Social impacts**

#### **6.9.1 Loss of employment and revenues**

People employed by the project will lose their jobs. This will have significant adverse impact on them 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 high, local and will be medium term.

- Direct impact is lost source of income
- Indirect may affect living standards
- Induced impact may include inability to sustain other activities that depended to thi source
- Cumulatively, may lead the increased number of unemployment in the village and district.

### **6.10 Environmental Impacts**

#### **6.9.2 Loss of aesthetic value due to haphazard disposal of demolished waste**

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

- This impact is direct as the income will immediately be terminated
- Indirectly affect the scenic value of the area

#### **6.9.3 Dust and noise pollution from demolishing works**

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

- i. The majority of the sources are mobile and will generate dispersed emissions and in a temporary way;
  - ii. The majority of the emissions will be generated starting from the concentrations of activities which are rather far away from the sensitive receivers; and
  - iii. The level of the emissions of the precursory pollutants and the atmospheric pollutants will vary from day to day, according to the type of activity done. However, even if the impact is very limited in time, it does not remain the same as it is subjected to a factor of expansion in space depending on the weather conditions. Of this fact the intensity of the impact of the building site on air pollution especially by the suspended particles is evaluated to be average.
- Indirectly exposure to loud noise can also cause high blood pressure, heart disease, sleep disturbances, and stress.

#### **6.9.4 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.

- The impact is direct as income for both Butiama town and Central government from this project will terminate/
- Indirectly will increase number of unemployment
- Loss of employment can induce collapse of other economic activities that were supported by employment
- The impact on town and Central government could be cumulative as loss of employment and induced activities could all reduce revenue to these organisations.

#### **6.10 Cumulative impacts**

Cumulative impacts are incremental changes caused by the project together with other presently ongoing, or reasonably foreseeable future planned actions/projects within the Project Area. Cumulative impacts act with others in such a way that the sum is greater than the parts. The project will have both positive and negative cumulative impacts during its implementation. The nature of cumulative impacts can be both short term in nature (restricted to the construction phase) and long term (occurring in both the construction and operation phases). This subsection presents cumulative impacts of the proposed projects at MNJUAT campus. The mitigation measures to either prevent or

minimise risks related to potential cumulative impacts have been provided in chapter seven.

### **6.10.1 Cumulative Socio-Economic Impacts**

#### **Positive Cumulative Socio-Economic Impacts**

The proposed establishment of MNJUAT at Butiama is likely to have positive impacts during project implementation. The proposed project shall modify the existing Butiama settlement due to introduction of the state of the art buildings. The project shall enhance the available social services by introducing the health services and education facilities hence contributing to the government efforts in providing health and education services to the people. Further, the presence of the proposed campus shall increase employment opportunities, increase income generation activities, changes in life style, and the increase in skills to local community more that the present status.

#### **Cumulative Negative Socio-Economic Impacts**

The establishment of the proposed MNJUAT Campus shall attract students, vendors, and staff from different social backgrounds. The increased number of people will cumulatively increase the impacts of social interactions between students/ staff/vendors and visitors at the campus with local community. Such impacts may include cumulative increase in communicable diseases (HIV, AIDS and other STDs as well as COVID 19 outbreak) and cumulative increase in theft, conflicts, traffic flow, crimes, access to social services such as education and other security issues.

### **6.10.2 Cumulative Impacts on Bio-physical Environmental**

#### **6.9.2.1 Greenhouse Gas Emissions and Climate Change**

Greenhouse gas emissions has a major influence on climate. Naturally occurring greenhouse gases such as Carbon dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Nitrous oxide (N<sub>2</sub>O) and Ozone (O<sub>3</sub>) play a key role in trapping the sun's heat, thereby maintaining the earth's temperature range necessary for life. Project implementation activities contribute to greenhouse gas emissions through the use of equipment, plants and vehicles during the construction phase. Also, the electricity use is associated with greenhouse gas emissions; since the electricity generation is met by hydropower and thermal generation plant. On the other hand, the increasing vegetation clearance during construction and operation phase reduce Carbon sequestration potential, hence reducing efforts towards climate change mitigation.



### **6.10.2.2 Acceleration of soil erosion and loss of biodiversity**

The proposed project area and the surrounding community have land parcels having affected by erosion due to agricultural and livestock keeping activities. On the other hand, the biodiversity at the proposed site is already disturbed. The proposed MNJUAT campus shall increase the effect of soil erosion through storm water generation and disturbance of soil material. Thus, the introduction of the new buildings and infrastructure shall lead to more soil erosion, more loss of biodiversity and associated ecosystem services. In addition, the presence of MNJUAT Campus shall attract land developments which will further intensify the soil erosion and biodiversity loss as well. These shall cause cumulative siltation to nearby water bodies and ecosystem services loss.

### **6.10.2.4 Cumulative impacts of liquid and solid waste generation**

The implementation of MNJUAT Campus shall generate solid and liquid wastes (both hazardous and non-hazardous). The future developments around the proposed site inclined by the presence of the campus shall attract people resulting to cumulative increase in liquid and solid waste generation within and around the campus. If not well controlled, they will lead to land and water pollution, and consequently impacting the public health.

## **6.11 PROJECT ALTERNATIVES**

Justification of establishing the Mwalimu Julius K. Nyerere University of Agriculture and Technology will depend very much on alternatives analysis. A number of alternatives were considered for realizing the project objectives. These include location and placement, designs, technology selection, construction technology, phases, operations and maintenance procedures, alternative routing and no project option etc. Analysis of different alternatives has been presented in the following chapters.

### **6.11.1 "NO" Project Alternative**

As a standard practice, the "No project alternative" was also considered (i.e. continue with life style as it is).

In the event that the proposed project is not allowed to take off, socio-economic benefits and economical gains anticipated from the University will not be there. Reduction of unemployment amongst youths and business programs, innovation mentorship as well as vocational skill training will not be realized.

The "No-project" alternative also will eliminate the opportunity of income generation activities and job creation. The anticipated local economic growth

through the increased circulation of money brought in by the students and staff will no longer be realized.

Also, this option is not favored by the Government policy, which aim to increase students in STEM for achieving the industrialized economy.

In addition, the much anticipated development and growth of the Butiama District will remain unchanged.

#### **6.11.2 With Project Alternative**

The establishment of the proposed project will bring numerous socio-economic benefits as outlined above:

Public consultation and discussions with the local leadership, local level government and the university staff members indicated that the socio-economic benefits of the project the nation outweigh the "without project" scenario. The project is therefore being recommended for implementation.

#### **6.11.3 Location Alternatives**

Several alternatives were considered before selecting the proposed site: First was to select land, which is free from conflicts. The idea was to avoid the impacts associated with resettlement.

Since the Contractor's camps location is not yet identified, the report advised the workers camps to be located adjacent to the village center so as to avoid unnecessary clearance of vegetation and make easy construction operations.

#### **6.11.4 Project site location**

Before selecting location site for the project, site inspection was done thoroughly to find the best site. Site selection based on the following criteria; physical suitability of the site, land free of conflicts and resettlements and compensation requirements, a land space that can allow construction of the university buildings with low construction costs minimal leveling of hills to establish foundation structures. After analysis of the alternative site locations, the present site were found to be more suitable and fit well all criteria mentioned above. It was a Government land and therefore there will be no compensation it also fits most of the criteria for selection as indicated above.

#### **6.11.5 Design Alternatives**

The proposed design of the university as outlined in the proposed development of the project is highly recommended to make the university run at its full

capacity. Main principle considered in the design of the university was refereed to Public Investment Management Operational Manual of 2014.

Additionally, it should be obvious that a university is an assemblage of different functional units each with an individual design and function, it therefore follows that the whole university can hardly have a 'design' of itself that can be opted out or in, implying that the 'design alternative' in the case of the proposed project does not work as a one design for all as it would have been say purchase of fire fighting truck, A change of design in this case is therefore not feasible.

#### **6.11.6 Technology Alternatives**

In construction activities, the project will promote adoption of appropriate technologies that are environmental responsive and are user friendly to internal and external stakeholders. This will include use of local contractors and consultancies and utilization of appropriate local technologies and building materials. External contractors will be used if and when appropriate. The envisaged uniqueness of the proposed University programs centers on innovative learning outcomes, program delivery, emphasis on practical training and skill development and use of science innovation labs/centers in spearheading innovation generation. Science innovation labs/centers will thus be at the center stage of enhancing transition of graduates in business enterprises as well as enabling them to participate in innovation generation. In regard to change of technology in the implementation of the proposed project, the alternative in question compares in aspects to the design concept above, that is the project is a multi-unit where each unit has implicitly its own design and technology such that one cannot change the universal technology of the whole system but of individual units, it again follows therefore that change of technology is not preferred.

#### **6.11.7 Liquid waste Management Alternatives**

Five alternatives have been considered for liquid waste management, namely stabilization ponds/lagoons; use of up-flow anaerobic sludge blanket (UASB); constructed treatment wetland; septic tank - soak away 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 fallbacks:

- i) It requires large space and its efficiency is influenced by climate conditions
- 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) Stabilization ponds can produce unpleasant odors, especially during warm weather. This can lead to complaints from nearby residents and affect the aesthetics of the surrounding area.
- iv) They might be less effective in removing certain pollutants, leading to concerns about water quality.

### **Alternative two: Use of Up-flow Anaerobic Sludge Blanket (UASB)**

Another alternative considered is to use 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 which could be used at the staff houses at the campus, and save costs. While UASB systems are effective in removing organic pollutants, they may not achieve the same level of nutrient and Phosphorus removal as some aerobic treatment processes. Thus, if the treated effluent is intended for discharge into sensitive aquatic ecosystems, additional aerobic treatment processes for nutrient removal may be needed after the UASB process.

### **Alternative three: Constructed treatment wetland**

The University shall consider 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 but needs more land compared to UASB for the proposed project. The system has Long Start-up Period, Maintenance Challenges and Odor Issues.

### **Alternative four: Use of septic tank and soak pits systems**

This involves the construction of underground tanks for treatment of sludge and is connected to soak pits for disposal of effluent. It is less expensive to construct

though regular emptying in large discharge points is required. Septic tanks and soak pits demand little space compared to other options.

#### **Alternative five: Discharge direct to the sewer system**

There are no sewerage system in vicinity of the site. This is not feasible and it will cost a lot to make it available.

**Conclusion and proposed treatment:** The individual technique analysis of the five alternatives showed that alternatives two (Up-flow Anaerobic Sludge Blanket (UASB)) and four (Use of septic tank and soak pits systems) are the most favorable. It is proposed that at the initial operation of the University option number four (i.e. use of septic tank and soak pits systems) should be directly connected to the Up-flow Anaerobic Sludge Blanket (UASB). The effluent from UASB can be used for irrigation purposes in demo farms or gardens considering that there will be agriculture programs. It also generates biogas, which could be another supplementary energy source for the University. Since the university project is close to water bodies like Lake Victoria and other small streams and dams, which are sensitive aquatic system, the university will require to construct treatment wetland for removing nutrients.

#### **6.11.8 Solid Waste Management Alternatives**

The proposed project will generate a considerable large amount of solid waste (estimated at 1.5stones/day) from hostels, stationeries, workshops, laboratories, restaurants and offices. The University has considered seven alternatives namely;

- i) Landfilling- it involves collection and transportation to dumpsite for disposal. This shall be considered a last resort due to loss of resources and the potential environmental impacts at disposal site.
- ii) Source Reduction: This approach focuses on reducing the amount of waste generated at the source followed by disposal at dumpsite.
- iii) Reuse: Encouraging the reuse of products and materials to the extent possible to extend their lifespan. However, not all materials can be reused.
- iv) Recycling: This will involve the collection and processing of materials to create new products and the rest shall be disposed off. Common recyclable materials include paper, glass, plastic, and metal.

- v) Composting: This will involve transforming organic waste, such as food scraps and yard trimmings, into nutrient-rich compost as valuable soil amendment.
- vi) Waste-to-Energy. It involves converting solid waste to energy source like briquettes.
- vii) Waste Sorting and Segregation at the source: This approach enhances the efficiency of downstream waste management processes. Implementing waste sorting at the source or through centralized facilities helps separate different types of waste for recycling, re-use, composting, or proper disposal.

**Conclusion:** 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 the dumpsite. Therefore, alternative one is not feasible. The university shall use an integrated solid waste management approach that involves a combination of alternative (ii) to (vii). The approach will holistically reduce waste generation. The generated waste shall be segregated and sorted into degradable and non-degradable; and recyclables and non-recyclables. All recyclables wastes will be collected and sold to recycles (includes papers and plastic containers). The degradable wastes will be collected for animal food and the rest shall be utilized in research activities such as composting, biogas generation and maggot production. The remaining non-decomposable and no recyclables will be stored on site in constructed chambers for final disposal.

### **Alternative Energy Sources**

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

- **Alternative one - Electricity:** In Tanzania, the supply of electricity from national grids is not reliable as it mostly originates from hydroelectric power generators, which depend on rainfall frequency, intensity and pattern.
- **Alternative two - Diesel generators:** These utilize fossil fuels, which tend to emit greenhouse gases especially when operated for a long time.

As such, diesel generators are used as standby power supply during power outages.

- ***Alternative three - Compressed Natural Gas (CNG):*** The University shall consider using the CNG, especially in the laboratories. CNG is the cleanest gas, thus its utilization would reduce environmental pollution.
- ***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 when found feasible. 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 using CNG. However, since some machines and laboratory equipment requires high voltage, which could not be supplied by solar energy, standby generators will also be provided, especially for the laboratories.

### **Water supply Alternatives**

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

The Butiama Water Supply and Sanitation Authority (MUWASA) is the leading water supplier at Butiama. This is the option considered to be appropriate as the water is sourced from Lake Victoria and its supply network is near the proposed site, and therefore can guarantee reliable, clean and safe water supply to the proposed MJNUAT Campus.

#### ***Alternative two: Groundwater Extraction***

Geotechnical investigation revealed that ground water is found at about 3m. Further, the presence of ponds at the proposed project area suggest that ground water is another alternative option for water supply and can supplement the water supply at the project site at such times of water shortage and scarcity. It has to be noted that before establishing the groundwater as sources of water supply, an investigation in terms of groundwater quantity and quality has to be thoroughly carried out and ascertained. Ground water investigation and well drilling have cost implications on the project. Further, utilization of ground water will necessitate investing on water treatment plant/equipment.

### ***Alternative three: Rainwater Harvesting***

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

**Conclusion:** The University opted to use a combination of two water sources namely piped water supply from RUWASA and rain water harvesting. MUWASA water will be used for domestic purposes and in the running of laboratory. Rainwater will be used for cleaning and gardens maintenance but shall be complemented by MUWASA water.

## **CHAPTER SEVEN**

### **7.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)**

This chapter presents a plan for implementing enhancement and mitigation measures for positive and negative impacts explained in Chapter 6. The measures aim at ensuring a minimal disturbance and continuity of the existing ecological balances and socio-economic wellbeing for the population in the area. The plan also aimed at ensuring timely fulfillment of institutional requirements of the EMA 2004 and other regulatory agencies as well as MJNUAT own policies on environmental sustainability, health and safety.

The estimated cost for inclusion of environmental and social mitigation measures in the project implementation works is TZS 1,258,000,000 (USD 524,166.67) and a proportion of this (USD 121, 250) will be in-built in the Contractor's BOQ(Table 22)



**Table 31 Environmental and Social Management Plan for the proposed establishment of MJNUAT**

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	<b>MOBILIZATION PHASE</b>				
	<b>SIGNIFICANT POSITIVE IMPACTS DURING</b>				
1.Job Creation	<ul style="list-style-type: none"> <li>• One of the strategies to enhance positive impacts is to create active strategy for achieving meaning employment to the local communities. These may include;</li> <li>• Involvement of the beneficiaries in discussion, surveys throughout the project lifespan,</li> <li>• Involving local authorities, underprivileged and policy makers</li> <li>• Practice frequent monitoring by gathering data, such as salary/wage rates, implementation of payments schedules.</li> <li>• Provide priority of employment to local, unemployed yet willing to work hard.</li> <li>• Employment should be on equal opportunities for all</li> <li>• Provide on-job training</li> <li>• Make sure information on employment reach a wide range of surrounding communities</li> </ul>		Contractor/ MJINUAT, LGAs	Preparatory Phase	5

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	<ul style="list-style-type: none"> <li>Encourage saving for workers in that the livelihood could be sustained even after job termination</li> </ul>				
	<b>SIGNIFICANT NEGATIVE IMPACTS</b>				
2.Disadvantages related to the management of solid wastes from demolition activities	<p>Reuse as initial filling materials where leveling of runway, taxiway and apron is required</p> <p>The Contractor to prepare a Waste Management Plan for solid, liquid and hazardous waste</p> <p>The Contractor to prepare a detailed Demolition Plan and Construction Management Plan to the satisfaction of the proponent and relevant Authorities prior to the commencement of works on site</p> <p>Contractor to encourage the principle of 3R's to his workers</p> <p>Materials that cannot be reused shall be sent to a the authorized dumpsite or dealers.</p>		Contractor/ MoEST/ MJNUAT-PIT	Preparation and operation phases	30

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	A hazardous materials inspection will be undertaken by an accredited consultant and a report issued. Hazardous materials to be removed in accordance with EMA 2004, ESMF and ESCP				
Risk of communicable diseases transmission e.g HIV/AIDS	<ul style="list-style-type: none"> <li>• Prepare and implement prevention and Contingency Plan for diseases outbreak</li> <li>• Practice awareness raising on the dangers of the HIV/AIDS within the project premises especially to those who are vulnerable</li> <li>• Institute mechanisms to support people living with HIV/AIDS.</li> <li>• Developer to establish its own health facilities</li> <li>• Provide First Aid Kit</li> <li>• Provide support for workers living with HIV/AIDS</li> <li>• Provide Voluntary Counseling and Testing (VCT) facility and regulations</li> <li>• Comply with HIV/AIDS laws</li> <li>• Comply with ESCP</li> </ul>	Zero new transmission for HIV/AIDS  ESS4:Community Health and Safety	Contractor NIT LGas	Construction	20
	<b>CONSTRUCTION PHASE</b>				
	<b>SIGNIFICANT POSITIVE SOCIO-ECONOMIC</b>				

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	<b>IMPACTS</b>				
4.Jobs creation	As explained in S/N 1 Above		Consultant Contractor/ MJNUAT-PIT LGAs	Constructio n phase	10
5. .Income to Local Suppliers and Service Providers	Sensitize on good quality products and services Provide fair market based prices for farm and non farm goods. Provide appropriate space for service providers		Contractor/ MJNUAT-PIT LGAs	Constructio n phase	2
6.Impact on Skills	Contractor shall provide on job skills and training		Contractor/ MoEST/ MJNUAT-PIT	Constructio n Phase	5
	<b>SIGNIFICANT NEGATIVE SOCIO-ECONOMIC IMPACTS</b>				
7.Occupatio nal Safety and Health Impacts	<ul style="list-style-type: none"> <li>• The Contractor to have a qualified health and safety officer onsite during construction phase,</li> <li>• Comply with OSHA, ESCP requirements</li> <li>• Clean up excessive waste debris and liquid</li> </ul>		Contractor/ MoEST/ MJNUAT- PIU	Constructio n phase	100

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	<p>spills regularly</p> <ul style="list-style-type: none"> <li>• Use of slip retardant footwear</li> <li>• Train and use of temporary fall prevention devices</li> <li>• Training and use of personal fall arrest systems,</li> <li>• The tie in point of the fall arresting system should also be able to support heavy loads</li> <li>• Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones.</li> <li>• Using a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels</li> <li>• Maintain clear traffic ways to avoid driving of heavy equipment over loose scrap</li> <li>• Provide and wear appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes</li> <li>• Train staff in emergency planning and</li> </ul>				

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	management; <ul style="list-style-type: none"> <li>Developing a detailed health and safety plan and training all contractor staff on the plan.</li> </ul>				
8.Gender Based Violence	<p>Contractor should have a clear policies on sexual harassment and verify that workers know and respect codes of conduct</p> <p>Inform workers about the project-related risks of gender-based violence, the prevention and mitigation measures</p> <p>Ensure the availability of effective grievance redress mechanism that minimize the reporting burden on victims</p> <p>Prepare and implement Prevention and Contingency Plan for diseases outbreak, SEA; SH/GBV</p> <p>Avoid exclusion and discrimination of vulnerable individuals</p>		Contractor/ MoEST/ MJNUAT	Construction phase	10

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
9. Gender Discrimination	<p>All people shall be employed as per Tanzania employment laws and regulations as well as ILO relevant and ratified laws</p> <p>Any form of discrimination shall be prohibited at the project site</p> <p>Support more women in senior roles and responsibilities</p> <p>Implement gender neutral recruitment process</p> <p>Provide training on unconscious biasness</p> <p>Have a clear policy on Gender inclusiveness and mainstreaming</p>		Contractor/ MoEST/ MJNUAT- PIU	Construction phase	5
10. Child Labor	Abide to the legal framework for Child Labor the Law of the Child Act (Act No. 21, 2009), which sets the minimum age for admission of a child to employment at 14 (Sec. 77.2).	Child Act (Act No. 21, 2009), which sets the minimum age for	Contractor/ MoEST/ MJNUAT- PIU	Construction phase	3

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	<p>Permit light work for children who are at least 12 for 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).</p> <p>Create awareness to the communities on the importance of education to their children</p> <p>Local authorities should develop bylaws to control the engagement of children in petty business or work in project related activities</p>	<p>admission of a child to employment at 14 (Sec. 77.2).</p> <p>Relevant ILO laws and regulations</p> <p>ESS2: Labor and Working Conditions</p>			
11.Conflict due to influx	<p>After satisfaction with recruitments, put signage like "No employment at the moment", to keep away job seekers.</p> <p>Local workers will be hired to the extent possible to minimise scarcity</p> <p>Workers will be required to sign worker codes of conduct</p>		Contractor/ LGAs, MJNUAT- PIU	Construction and operation	10



Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	Strengthen security and policing systems				
	<b>SIGNIFICANT NEGATIVE ENVIRONMENTAL IMPACTS</b>				
12.Impacts on air quality	<ul style="list-style-type: none"> <li>• Institute regular maintenance of equipment</li> <li>Enforce vehicle road restrictions to avoid excess emissions from engine overloading, where practical switching off engines will be done when not in use;</li>   <li>• Practice routine inspection of equipment;</li> <li>• Trucks transporting materials shall be fully covered</li> <li>• Turn off engines to reduce idling.</li> <li>• Protect stockpiles of friable material subject to wind through wetting;</li> <li>• Cover loads with of friable material during transportation;</li> <li>• Restrict speed on loose surface roads to 30Km/hr. during dry or dusty conditions; and</li> <li>• Douse with water of roadways and work sites to reduce dust when necessary</li> </ul>	<p>Ambient Air Quality</p> <p>9.0 -10.0 µg/m<sup>3</sup></p> <p>ESS4:Community Health and Safety</p>	Contractor/ MoEST/ MJNUAT- PIU	Construction phase	10

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
11.Impacts on noise and vibrations	<p>Restrict vehicles carrying construction materials to work during day times only</p> <p>Machine operators in various sections with significant noise levels shall be provided with noise protective gear; and</p> <p>Construction equipment shall be selected, operated and maintained to minimize noise.</p> <p>Impact pile driving shall be avoided where possible in vibration sensitive areas; and</p> <p>Vibratory rollers and packers shall be avoided. Comply with OSHA requirements</p>	<p>TBS-NES Limits 45 <b>dba</b> during day time and 35 <b>dba</b> at nights</p> <p>WB/IFC Guideline during day time and 45 <b>dba</b> at nights</p> <p>ESS4:Community Health and Safety</p>	Contractor/ MoEST/ MJNUAT-PIU	Construction phase	5
12.Wastewater management problems	<p>Wastewater shall be properly treated in the Septic Tank Before disposal into the Soak Away Pit within the site and then link to the Up-flow Anaerobic Sludge Blanket (UASB).</p> <p>The effluent from UASB can be used for irrigation</p>		Contractor/ MoEST/ MJNUAT-PIU	Construction phase	30

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	<p>purposes in demo farms or gardens considering that there will be agriculture programs.</p> <p>Contractor shall be instructed to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste; and</p> <p>Training on waste management shall be done to all personnel, operators and services providers.</p>				
14.Solid waste generation	<p>Contractor shall be instructed to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste; and</p> <p>Train waste management to all personnel, operators and services providers.</p> <p>Designated area for wastes collection.</p> <p>Provide wastes receptacles and labeling.</p> <p>Only authorised waste collection agency at Butiama/Musoma will be engaged for collection of</p>	ESS4:Community Health and Safety	Contractor/ MoEST/ MJNUAT-PIU	Construction phase	20

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	<p>the waste.</p> <p>Encourage application of 3R's waste management</p> <p>Sort waste and provide waster bins accordingly</p> <p>Comply with OSHA and ESCP guidelines</p>				
15.Erosion of Exposed Surfaces	<p>Undertake construction 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;</p> <p>Maintain gravel fill and/or re-vegetate around the structures;</p> <p>Unnecessary ground clearance and sensitive re-alignments shall be avoided;</p> <p>Directing flow to properly designated channels;</p> <p>All excavation works shall be properly backfilled and compacted; and</p>		Contractor/ MoEST/ MJNUAT- PIU	Construction phase	7

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	Concentrate construction activities in designated areas				
16.Landscape and visual impacts	<p>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.</p> <p>Institute landscape engineering, tree planting and ground modeling.</p> <p>Practice efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted</p>		Contractor/ MoEST/ MJNUAT- PIU	Construction phase	7
17.Loss of vegetation	<p>Clearance of patches of native forest remaining in the neighborhood of the proposed project shall be avoided</p> <p>Close supervision of earthworks shall be observed in order to confine land clearance within the project site</p>		Contractor/ MoEST/ MJNUAT- PIU	Construction phase	10

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	<p>The contractor shall give the uprooted trees to the residents through ward/streets governments or any other arrangement may seem convenient provided he does not contravene the Forest Acts 2002.</p> <p>Designed and implemented appropriate landscaping programme to help in re-vegetation of part of the project area after construction end.</p>				
18.Increased Pressure on Social Services and Utilities	<p>Use of water conservatively by instituting technologies (e.g. self-lock water tape) and awareness raising notices to users, etc.</p> <p>Construct underground water reserve tank and introduce rainwater harvest systems.</p> <p>Apply 3R's water recycling, reuse or reduce amount of consumption.</p> <p>Use of air conditioning shall be kept to a minimum and maintenance of the cool indoor environment</p>		MJNUAT-PIU, LGAs, MoEST,	Operation phase	200

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	<p>using natural ventilation system shall be strongly explored during the design process.</p> <p>Build more primary and secondary schools</p> <p>Provide/strengthen health facilities and infrastructure as well as human resources.</p> <p>Developer to construct its own health</p> <p>Provide Health Insurance for all</p>				
19. Water Pollution	<p>Use efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at project areas;</p> <p>Provide waste disposal bins and warning notices, posted at strategic points;</p> <p>No, on site burial or open burning of solid waste shall be permitted.</p> <p>Wastes not suitable for incinerations and general municipal waste dumping (e.g., Batteries, plastics,</p>	<p>Faecal coliform count</p> <p>TZS 789: 2018-2018 and WHO (2011) Guidelines. microbial cell should 'not be detectable' or 'absent'</p> <p>Colour TZS 789: 2018- EAS 12: 2018</p>	Contractor and supervision consultant	Operation Phase	500

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	rubbers, tires, etc.) shall be removed for recycling, treatment, and/or disposal by licensed contractor as appropriate; and	<p>ICS) is 50 TCU for untreated and 25NTU for treated water</p> <p>WHO (2011) Guidelines not specified</p> <p>chemical pollutants 50 TCU for (TZS 789: 2018-EAS 12: 2018 ICS) Natural Portable Water and for WHO (2011) Guidelines not specified</p> <p>Turbidity: TZS 789: 2018- EAS 12: 2018 ICS) which is 25NTU Natural Portable Water and for WHO (2011) Guidelines not specified.</p> <p>Orthophosphate: TZS789:2018 is</p>			



Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
		2.2mg/l but for WHO (2011) not specified ESS4:Community Health and Safety			
20.Storm water generation and overflow	<p>The design storm water drainage will be given a high priority, with the limitation of gradient (slope) required for the runway, taxiway and apron.</p> <p>Proper hydrology analysis will be carried out, considering the topographical features, amount of rainfall and catchments area as the major factors of design of storm water channel. Channel with the capacity of accommodating the amount of water found will be provided/designed.</p> <p>Rainwater harvesting will be used at the MJNUAT campus</p> <p>The design shall consider enough greeneries in the</p>		MoEST/ MJNUAT- PIU	Operation Phase	150

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	project site				
21.Health and Safety Risks Due to Fire Hazards	<p>Adequate number of portable fire extinguishers shall be placed at strategic locations.</p> <p>Good housekeeping shall be maintained at all sites to reduce the fire risk.</p> <p>The design of the buildings shall strictly adhere to the Fire Safety Standards</p> <p>Fire detectors and sprinkler system shall be installed in buildings</p>	OSHA Standards ESS4:Community Health and Safety	MJNUAT	Operation phase	50
22.Traffic accidents	<ul style="list-style-type: none"> <li>• Institute speed limit</li> <li>• Provide protective gars</li> <li>• Provide first aid kits</li> <li>• Provide safety education to workers</li> <li>• Provide danger signs/billboards in the project area</li> </ul>	Contractor, Developer ESS4:Community Health and Safety	Developer District Police	Construction	

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	<b>OPERATION PHASE</b>				
	<b>SIGNIFICANT SOCIAL POSITIVE IMPACTS</b>				
23. Production of experts in STEM	Encourage pupils in secondary schools to pursue STEM related subjects  Encourage surrounding communities to take to school their children and later join the university in the locality, which will be cheaper.  Support more lecturers to pursue STEM related degrees. Establish more e-learning STEM related programmes	At least 1500 students enrolled in STEM related subjects  53 academic and administrative staff studied undergraduate studies	Developer, MoEST, TCU	Operation	5
23. Job Creation	As explained in S/N 1		Developer, MoEST		
24. Increased extension services	Practice routine visit to farmers surrounding the university Conduct short courses for farmers and livestock keepers Introduce help desk for farmers and livestock keepers Conduct research that respond to real world		Developer MoEST COSTECH	Operation	50

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	problems.				
	<b>SIGNIFICANT NEGATIVE SOCIAL IMPACTS</b>				
25. Risk of security decrease	Establish Auxiliary Police in the campus OCD to enhance security services in the campus Install CCTV camera in the campus		Developer OCD	During operation	20
26. Cultural norms degradation	Educate on the importance of maintaining good culture, Educate on the importance of cultural difference tolerance  Preserve properly chance finds of physical cultural issues.		Developer LGAs	During operation	5
26. Gender Based Violence	Inform workers about the project-related risks of gender-based violence, the prevention and mitigation measures  Ensure the availability of effective grievance redress mechanism that minimize the reporting burden on victims		Contractor/ MoEST/ MJNUAT	Construction phase	10

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	Prepare and implement Prevention and Contingency Plan for diseases outbreak, SEA; SH/GBV Avoid exclusion and discrimination of vulnerable individuals				
27. Occupational Safety and Health Impacts	<ul style="list-style-type: none"> <li>Comply with OSHA, ESCP requirements</li> </ul>		Contractor/ MoEST/ MJNUAT- PIU	Construction phase	20
28. Increased Pressure on Social	As Discussed in S/N 18	As Discussed in S/N 18	As Discussed in S/N 18	As Discussed in S/N 18	50
	<ul style="list-style-type: none"> <li></li> </ul>				
	<b>SIGNIFICANT ENVIRONMENTAL NEGATIVE IMPACTS</b>				
29. Liquid waste generation	Developer shall be instructed to put on his/her methodologies for handling hazardous waste such as oils, lubricants and non-combustible waste; and		Developer OSHA	Operation	50

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
	<p>Train waste management to all personnel, operators and services providers. Designated area for wastes collection.</p> <p>Provide wastes receptacles and labeling.</p> <p>Only authorised waste collection agency at Butiama/Musoma will be engaged for collection of the waste.</p> <p>Encourage application of 3R's waste management</p> <p>Sort waste and provide waster bins accordingly</p> <p>Comply with OSHA and ESCP guidelines</p>				
	<b>DECOMMISSION PHASE</b>				
30. Loss of jobs	<p>Advise alternative livelihoods</p> <p>Provide information on other employment opportunities</p>		Developer LGAs	Decommissioning	10
31.Loss of aesthetic value due to	<p>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</p>	OSHA	MJNUAT-PIT	Decommissioning phase	30

Identified Impact	Mitigation/Enhancement Measures	Standard Thresholds	Responsible Institution	Time of mitigation	Relative cost (TZS) Million
haphazard disposal of demolished waste	<p>material for new construction work.</p> <p>All the necessary health and safety measures shall be implemented</p> <p>Restore the affected land.</p>	ESS4:Community Health and Safety			
	Total				1,469

## CHAPTER EIGHT

### 8.0 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

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

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

To ensure that mitigation measures are properly done, monitoring is essential. Table 24 provides details of the attributes to be monitored, frequency, and institutional responsibility and estimated costs. These costs are only approximations and therefore indicative. Costs that are to be covered by the developer should be included in the project cost.

#### 8.1 Health and Safety

Careful observance of safety regulations and guidelines will be ensured in order to avoid unhealthy occurrences:

- All workers shall be provided with safety gears including coats, shoes, gloves and dust masks to protect them from exposure to various products, etc.
- Safety equipment will be provided and extinguishers will be situated in all buildings.



- To avoid disease transmission, the MJNUAT should provide HIV, STDs, COVID-19 and social awareness education to contractor personnel and local community

## **8.2 Cumulative impact**

This development over time will result in a variety of changes. The most evident of these changes may be:

- This development will see a significant change in the land cover and landscape of the area.
- The general culture of the area would change. A more likely result is a formal urban setting with the associated physical infrastructure and amenities

## **8.3 Monitoring of key environmental and social parameters**

Monitoring of all key environmental and social parameters that could potentially lead to an impact will be required to analyze the impacts of construction and operation on the environment. Therefore, self-mentoring and reporting techniques will be adopted to carry out monitoring. MJNUAT Management shall be responsible for monitoring of residual impacts. The university management will identify the best monitoring techniques and frequency of selected parameters for monitoring will be followed.

An outline of the monitoring programmes proposed for the construction and operation phases, is presented in the following tables. Monitoring process will enable MJNUAT to understand how environmental performance will change over time and will facilitate improvements to the Environmental and social management system.

**Table 32 Monitoring programme during construction phase**

<b>Impact</b>	<b>Enhancement/Mitigation measures</b>	<b>Monitoring parameter</b>	<b>Standard/Threshold</b>	<b>Frequency</b>	<b>Measurement</b>	<b>Responsibility</b>	<b>Cost (TZS)/yr (Million)</b>
	<b>Positive socio-economic impacts</b>						
1. Job Creation	<p>Employment impact is high, extended and long term.</p> <p>It is direct as the employed people will benefit direct by earning wages and/or salaries.</p> <p>One of the strategies to enhance positive impacts is to create active strategy for achieving meaningful employment to the local communities. These may include;</p> <p>Involvement of the</p>	<p>Number of employees by gender</p> <p>Number of employees by geographical location</p> <p>Number of induced jobs from the project existence</p> <p>Number of employee with special needs</p>		Annually	Surveys, Reports consultations	MJNUAT LGAs Contractor	5

Impact	Enhancement/Mitigation measures	Monitoring parameter	Standard/Threshold	Frequency	Measurement	Responsibility	Cost (TZS)/yr (Million)
	<p>beneficiaries in discussion, surveys throughout the project lifespan, Involving local authorities, underprivileged and policy makers</p> <p>Practice frequent monitoring by gathering data, such as salary/wage rates, implementation of payments schedules.</p> <p>Provide priority of employment to local, unemployed yet willing to work hard.</p> <p>Employment should be on equal opportunities for all</p> <p>Provide on-job</p>	Rate of wages/salary					

Impact	Enhancement/Mitigation measures	Monitoring parameter	Standard/Threshold	Frequency	Measurement	Responsibility	Cost (TZS)/yr (Million)
	<p>training</p> <p>Make sure information on employment reach a wide range of surrounding communities</p> <p>Encourage saving for workers in that the livelihood could be sustained even after job termination</p>						
2.Food Scarcity and price increase	<ul style="list-style-type: none"> <li>• Increase food productivity to farmers through extension services and best agronomic practices.</li> <li>• Promote irrigation agriculture</li> </ul>	<p>Number of households with food insecurity</p> <p>Number of kg produced per acre</p>		<p>Reports</p> <p>Survey</p> <p>Yield per acre</p>	<p>MJNUAT</p> <p>LGAs,</p> <p>MoA</p> <p>MoLFD</p>	Annually	5

Impact	Enhancement/Mitigation measures	Monitoring parameter	Standard/Threshold	Frequency	Measurement	Responsibility	Cost (TZS)/yr (Million)
	<ul style="list-style-type: none"> <li>• Provide competitive price to farmers</li> <li>• Improve grain storage facilities at farm level</li> <li>• Build capacity on agro-processing and value addition at farm level</li> <li>• Allow smooth flow of food market</li> </ul>	<p>Price of crops</p> <p>Number of farm crops processed and value added</p> <p>Number of acres under irrigation</p>					
3. Increased skills due learning by doing	<p>Contractor to run on-job training regularly</p> <p>Give priority employment to local workers with relevant skills to take high pay jobs.</p> <p>Provide short term trainings outside work place</p>	<p>Number of workers gained skills at work</p> <p>Number of on-job trainings conducted</p> <p>Number of workers attended short causes</p>		Bi-annually	Reports Surveys	Developer Constructor LGAs	5

<b>Impact</b>	<b>Enhancement/Mitigation measures</b>	<b>Monitoring parameter</b>	<b>Standard/Threshold</b>	<b>Frequency</b>	<b>Measurement</b>	<b>Responsibility</b>	<b>Cost (TZS)/yr (Million)</b>
4. Increased experts in STEM related knowledge and skills	<p>Encourage and sensitize pupils in secondary schools to pursue STEM related subjects</p> <p>Encourage surrounding communities to take their children to school and later join the university in their locality, which will be relatively cheaper.</p> <p>Support more lecturers to pursue STEM related degrees.</p> <p>Establish e-learning STEM related programmes</p>	<p>Number of sensitization and awareness conducted at schools and communities</p> <p>Number of students graduated in STEM related degrees</p> <p>Number of lecturers trained in STEM related high degrees</p> <p>Number of students studies at MJNUAT STEM</p>		Bi-annually	<p>Reports</p> <p>Surveys</p>	<p>Developer</p> <p>MoEST</p> <p>LGAs</p>	5

<b>Impact</b>	<b>Enhancement/Mitigation measures</b>	<b>Monitoring parameter</b>	<b>Standard/Threshold</b>	<b>Frequency</b>	<b>Measurement</b>	<b>Responsibility</b>	<b>Cost (TZS)/yr (Million)</b>
		related degrees  Number of programmes under e-learning					
5. Improved extension services in the surrounding	Provide extension services and establish help desk at the University for extension services,  Have a culture of visiting and providing extension services to the neighbor farming communities  Conduct research to address problems facing farming communities surrounding the	Existence of extension services help desk  Number of visits made to farmers  Number of researches Conducted to address farmers constraints		Bi-annual	Reports  Surveys	Developer  TARI  TLRI  MoA  LGAs  TAFIRI	10

<b>Impact</b>	<b>Enhancement/Mitigation measures</b>	<b>Monitoring parameter</b>	<b>Standard/Threshold</b>	<b>Frequency</b>	<b>Measurement</b>	<b>Responsibility</b>	<b>Cost (TZS)/yr (Million)</b>
	<p>university and countrywide.</p> <p>Build capacity on value addition and agro-processing for agricultural and non-agricultural products by communities surrounding the University and beyond</p> <p>Conduct short courses for farmers, livestock keepers and fishers</p>	<p>Number of persons attended capacity building trainings on value addition and agro-processing</p> <p>Number of short courses conducted to farmers</p>					
	<b>Negative socio-economic impacts</b>						
6.Communicable Disease	Raise awareness on HIV/AIDS, and means to suppress its	Number of trainings on safety, health	ESS4:Community Health and Safety	Monthly	Report Surveys	Contractors and Supervision	20



Impact	Enhancement/Mitigation measures	Monitoring parameter	Standard/Threshold	Frequency	Measurement	Responsibility	Cost (TZS)/yr (Million)
Transmission	<p>incidence.</p> <p>Deploy locally available labor as practically as it could be possible</p> <p>Conduct a safety, health and environment induction training to all workers, putting more emphasis on HIV/AIDS, Hepatitis B and other communicable diseases.</p> <p>Provide and encourage the use of preventive measures.</p> <p>Include measures to</p>	<p>and environment induction training</p> <p>Number of employees from local communities</p> <p>Existence of preventive facilities</p> <p>No of new infections</p> <p>Number of people under medical care and university support</p>			<p>Physical observation</p> <p>Medical reports</p> <p>Surveys</p>	<p>Consultant</p> <p>Universities</p> <p>Health center</p> <p>Contractor</p> <p>Developer</p> <p>LGAs</p>	

Impact	Enhancement/Mitigation measures	Monitoring parameter	Standard/Threshold	Frequency	Measurement	Responsibility	Cost (TZS)/yr (Million)
	<p>demonstrate how workers will work in a Covid-19 secure manner</p> <p>Prevent creation of breeding sites for vectors such as mosquitoes.</p> <p>Provide early treatment of STDs and encourage using ARVs.</p> <p>Avoid stigmatization for the affected persons.</p> <p>Provide VCT facility Provide timely treatment and vaccination</p>	<p>Availability of preventive facilities</p> <p>Number of measures undertaken to prevent breeding sites for malaria vectors.</p> <p>Number of sensitization conducted on anti-stigmatisation on HIV/AIDS</p> <p>Number of</p>					

<b>Impact</b>	<b>Enhancement/Mitigation measures</b>	<b>Monitoring parameter</b>	<b>Standard/Threshold</b>	<b>Frequency</b>	<b>Measurement</b>	<b>Responsibility</b>	<b>Cost (TZS)/yr (Million)</b>
	Develop Health and Ethical Plan  Develop diseases outbreak contingency Plan	people attended VCT  Existence of Develop diseases outbreak contingency Plan					
7. Child Labour	Abide to the legal framework for Child Labor the Law of the Child Act (Act No. 21, 2009), which sets the minimum age for admission of a child to employment at 14 (Sec. 77.2).  Permit light work for children who are at least 12 for work that is not likely to be harmful to the health or development of the child and does	Number of children employed	Child Act (Act No. 21, 2009), which sets the minimum age for admission of a child to employment at 14 (Sec. 77.2).  Relevant	Weekly	Reports  Surveys  Physical observation	Proponent Contractor Consultant LGAs	5

Impact	Enhancement/Mitigation measures	Monitoring parameter	Standard/Threshold	Frequency	Measurement	Responsibility	Cost (TZS)/yr (Million)
	not affect the child's attendance at school or the capacity of the child to benefit from schoolwork (Sec.77.3).		ILO laws and regulations  ESS2: Labor and Working Conditions				
8.SEA; SH/GBV	<p>Prepare and implement Prevention and Contingency Plan for diseases outbreak, SEA; SH/GBV</p> <p>Develop and implement Code of Conduct at work place</p> <p>Build capacity to prevent SEA/SH</p>	<p>Prevention and Contingency Plan for diseases outbreak, SEA; SH/GBV</p> <p>Presence and practice Code of Conduct</p> <p>Number of people attended capacity prevent GBV</p>	ESS4:Community Health and Safety	Monthly	<p>List of employ by gender and by disabilities Presence of labor Management Plan</p> <p>Presence of Prevention and Contingency</p> <p>Plan for diseases</p>	Contractors and Supervision Consultant	10

Impact	Enhancement/Mitigation measures	Monitoring parameter	Standard/Threshold	Frequency	Measurement	Responsibility	Cost (TZS)/yr (Million)
	Address Grievance and GBV/SH through by developing and implementing GRM	and SEA/SH Presence of Code of Conduct Number of workers built capacity to handle SEA/SH List of individual handled on Grievance and GBV/SH Existence of GRM			outbreak, SEA; SH/GBV Presence of Code of Conduct Number of workers built capacity to handle SEA/SH List of individual handled on Grievance and GBV/SH		
	<b>Significant environmental impacts</b>						
9. Noise	Vehicles carrying	Day and night	ESS4:Comm	Weekly	Noise	Contractor/Mo	10

Impact	Enhancement/Mitigation measures	Monitoring parameter	Standard/Threshold	Frequency	Measurement	Responsibility	Cost (TZS)/yr (Million)
	<p>construction materials shall be restricted to work during day time only;</p> <p>Machine operators in various sections with significant noise levels shall be provided with noise protective gear; and</p> <p>Construction equipment shall be selected, operated and maintained to minimize noise.</p> <p>Impact pile driving shall be avoided where possible in vibration sensitive areas; and Vibratory</p>	noise levels	unity Health and Safety		monitoring at direct interference (within 500 m)	EST/MJNUAT	

Impact	Enhancement/Mitigation measures	Monitoring parameter	Standard/Threshold	Frequency	Measurement	Responsibility	Cost (TZS)/yr (Million)
	rollers and packers shall be avoided.						
10.Air quality	<p>Equipment shall be maintained in good running condition, no equipment to be used that generates excessive black smoke;</p> <p>Enforce vehicle road restrictions to avoid excess emissions from engine overloading, where practical switching off engines will be done when not in use;</p> <p>There will be routine inspection of equipment;</p>	<p>Temperature Pressure drop H2S Combustible gases</p>	<p>ESS4:Community Health and Safety  OSHA</p>	Monthly	Air emissions monitoring through a Continuous Emissions Monitoring (CEM) System	Contractor	10

Impact	Enhancement/Mitigation measures	Monitoring parameter	Standard/Threshold	Frequency	Measurement	Responsibility	Cost (TZS)/yr (Million)
	<p>Trucks transporting materials shall be fully covered; and</p> <p>Turn off engines to reduce idling.</p> <p>Protect stockpiles of friable material subject to wind through wetting;</p> <p>Cover loads with of friable material during transportation;</p> <p>Restrict speed on loose surface roads to 30Km/hr. during dry or dusty conditions; and</p> <p>Douse with water of</p>						



Impact	Enhancement/Mitigation measures	Monitoring parameter	Standard/Threshold	Frequency	Measurement	Responsibility	Cost (TZS)/yr (Million)
	roadways and work sites to reduce dust when necessary						
11. Vibration	<p>Restrict vehicles carrying construction materials to work during day times only</p> <p>Provided noise protective gear for operators on machine with significant noise levels</p> <p>Construction equipment shall be selected, operated and maintained to minimize noise.</p>	Vibration	<p>TBS-NES Limits 45 <b>dba</b> during day time and 35 <b>dba</b> at nights</p> <p>WB/IFC Guideline during day time and 45 <b>dba</b> at nights</p> <p>ESS4:Community Health and Safety</p>	daily	Vibration in dbA	Proponent Contractor OSHA	10

<b>Impact</b>	<b>Enhancement/Mitigation measures</b>	<b>Monitoring parameter</b>	<b>Standard/Threshold</b>	<b>Frequency</b>	<b>Measurement</b>	<b>Responsibility</b>	<b>Cost (TZS)/yr (Million)</b>
	Vibratory rollers and packers shall be avoided.		OSHA standards				

<b>Impact</b>	<b>Enhancement/Mitigation measures</b>	<b>Monitoring parameter</b>	<b>Standard/Threshold</b>	<b>Frequency</b>	<b>Measurement</b>	<b>Responsibility</b>	<b>Cost (TZS)/yr (Million)</b>

<b>Impact</b>	<b>Enhancement/Mitigation measures</b>	<b>Monitoring parameter</b>	<b>Standard/Threshold</b>	<b>Frequency</b>	<b>Measurement</b>	<b>Responsibility</b>	<b>Cost (TZS)/yr (Million)</b>
		Existence of Grievance Redress Mechanism records Training records		Monthly	Maintain grievance mechanism Analyze workers and community grievance trends Maintaining training records	Contractor/MOEST/MJNUAT	5
12. Waste management problems	Practice waste managed through 3R's principle  Stockpile top soil for back filling trenches and re-vegetation  Monitor chemical parameter for contamination;	Presence of segregate reusable materials for 3R's application  Presence of stockpiled top soils  Existence of plan for		Monthly	Physical observation  Survey interviews	Contractor and Supervision Consultant	20

Impact	Enhancement/Mitigation measures	Monitoring parameter	Standard/Threshold	Frequency	Measurement	Responsibility	Cost (TZS)/yr (Million)
	<p>Provide waste storage bins or build waste collection enclosures;</p> <p>Burn waste material in an enclosure or kiln;</p> <p>Collect asbestos and other dangerous waste and dispose as per guided by laws</p> <p>Use of personal respiratory/protective gears</p> <p>Manage e-waste properly</p> <p>Dispose sold waste in</p>	<p>monitoring for chemical parameter for contamination</p> <p>Presence of waste storage bins or build waste;</p> <p>Presence of incinerator</p> <p>Presence of collected and well stored asbestos</p> <p>Number of workers using respiratory/protective gears</p> <p>Existence of</p>					

<b>Impact</b>	<b>Enhancement/Mitigation measures</b>	<b>Monitoring parameter</b>	<b>Standard/Threshold</b>	<b>Frequency</b>	<b>Measurement</b>	<b>Responsibility</b>	<b>Cost (TZS)/yr (Million)</b>
	designated landfills  Provide Waste Management Plan	solid waste landfills  Presence Waste Management Plan including hazardous waste  Reports on Water quality Monitoring data on pH, COD, BOD, NOx, Heavy metals					
13. Soil Erosion	Identify erosion prone areas and, provide permanent erosion control measures	Presence of permanent erosion control measures  Existence of		Monthly	Survey Interviews Physical Observation  Reports	Contractor and Supervision Consultant	15

Impact	Enhancement/Mitigation measures	Monitoring parameter	Standard/Threshold	Frequency	Measurement	Responsibility	Cost (TZS)/yr (Million)
	<p>Reinstate areas damaged by the erosion</p> <p>Avoid unnecessary tree/vegetation cut</p> <p>Apply minimum tillage</p> <p>Undertake construction as per engineering design and procedures;</p> <p>Maintain gravel fill and/or re-vegetate around the structures;</p> <p>All excavation works shall be properly backfilled and compacted</p>	<p>planted trees and other vegetation on areas damaged by the erosion</p> <p>Evidence of construction as per engineering design</p> <p>Evidence of maintained gravel fill and/or re-vegetate structures;</p> <p>Evidence of plan to manage environment</p>					

Impact	Enhancement/Mitigation measures	Monitoring parameter	Standard/Threshold	Frequency	Measurement	Responsibility	Cost (TZS)/yr (Million)
		Presence of properly backfilled and compacted soils.					
14.Underground water	<p>Use efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at project areas;</p> <p>Provide waste disposal bins and warning notices, posted at strategic points;</p> <p>No, on site burial or</p>	Physiochemical analysis Of Underground water		Every 12 months for sample analysis	Monitoring of underground Water at direct interference (within 500 m)	MJNUAT	12



<b>Impact</b>	<b>Enhancement/Mitigation measures</b>	<b>Monitoring parameter</b>	<b>Standard/Threshold</b>	<b>Frequency</b>	<b>Measurement</b>	<b>Responsibility</b>	<b>Cost (TZS)/yr (Million)</b>
	open burning of solid waste shall be permitted.  Wastes not suitable for incinerations and general municipal waste dumping (e.g., Batteries, plastics, rubbers, tires, etc.) shall be removed from 3R's application						
				Monthly	Monitoring of Health and Safety implementation by the workforce	MJNUAT	5
15. Access to value addition and agro-processing	Establish Outreach services plan  Conduct farmers	No. of products with value addition  No. of		Semi-annually	Reports  Survey/interviews	Developer  LGAs	

<b>Impact</b>	<b>Enhancement/Mitigation measures</b>	<b>Monitoring parameter</b>	<b>Standard/Threshold</b>	<b>Frequency</b>	<b>Measurement</b>	<b>Responsibility</b>	<b>Cost (TZS)/yr (Million)</b>
technologies	short courses on agro-processing	trainings					
16. Production of skilled labor force for implementing various development policies, plans and goals for sustainable social and economic growth of the Nation	<p>Sensitize students in secondary schools,</p> <p>Develop good quality curricula</p> <p>Build capacity on lecture</p> <p>Select high quality students for admission</p>	<p>No. of students enrolled in STEM</p> <p>No. of staff employed by qualification</p> <p>No. of research undertaken</p> <p>No of students and lecturers trained</p>		Annually	Reports	<p>MJNUAT</p> <p>MoEST</p> <p>PO- Public Service and Governance</p> <p>Parents</p> <p>LGAs</p>	5

**Table 33 Monitoring programme during decommissioning phase**

<b>Receptor</b>	<b>Mitigation measures</b>	<b>Monitoring parameter</b>	<b>Frequency</b>	<b>Measurements</b>	<b>Responsibility</b>	<b>Cost (TZS) per year (Million)</b>
17. Underground water	Use efficient collection and disposal system based on the principles of reduction, re-use and recycling of materials, shall be instituted at project areas;	Turbidity / Suspended solids	Weekly	Monitoring of ground water quality	MJNUAT/Contractor	5
	Provide waste disposal bins and warning notices, posted at strategic points;	Oil and grease	One month after direct interference			
	No, on site burial or open burning of solid waste shall be permitted. Wastes not suitable for incineration and general municipal waste dump (e.g., Batteries, plastics, rubbers, etc.) shall be removed for recycling treatment, and/or disposal by licensed contractor as appropriate	Number of leakage events caused during the construction	Continuous	Identification and reporting of leakage events	MJNUAT/Contractor	12

<b>Receptor</b>	<b>Mitigation measures</b>	<b>Monitoring parameter</b>	<b>Frequency</b>	<b>Measurements</b>	<b>Responsibility</b>	<b>Cost (TZS) per year (Million)</b>
18.Dust and noise pollution from demolishing works	A site waste management plan will be prepared by the contractor prior to commencement of demolition works. The contractor will close the surface with water to suppress excessive dust and whenever possible, water sprinklers shall be used. Also, the contractor will provide protective gear (i.e. breathing masks) to workers working in dusty and noise environment.	Day and night noise levels	Weekly	Noise monitoring at direct interference (within 500 m)	MJNUAT/Contractor	6

<b>Receptor</b>	<b>Mitigation measures</b>	<b>Monitoring parameter</b>	<b>Frequency</b>	<b>Measurements</b>	<b>Responsibility</b>	<b>Cost (TZS) per year (Million)</b>
19. Health and safety		Total recordable incidents, lost time incidents and other H&S indicators.  Records verifying the conditions of Personal Protected Equipment	Weekly	Health and Safety (H&S) monitoring and audits.  H&S Performance evaluation  Personal Protected Equipment monitoring	MJNUAT/Contractor	5

<b>Receptor</b>	<b>Mitigation measures</b>	<b>Monitoring parameter</b>	<b>Frequency</b>	<b>Measurements</b>	<b>Responsibility</b>	<b>Cost (TZS) per year (Million)</b>
		Grievance mechanism records Training records	Monthly	Maintain grievance mechanism Analyze workers and community grievance trends Maintaining training records	MJNUAT/Contractor	5
<b>Total</b>						<b>187</b>

## **CHAPTER NINE**

### **9. COST BENEFIT ANALYSIS OF THE PROJECT**

#### **9.1 Introduction**

This Chapter addresses financial analysis, economic analysis of the project and an extended cost-benefit analysis for the proposed project. Lack of information on aspects such as cost and units for various materials that will be used in the construction process, overall running costs, cost of labour, etc. Therefore, what is presented in this section is rather an indicative and elementary qualitative description of the costs and benefits. It is based on the indicative costs for implementation of mitigation measures as well as the cost of monitoring. However, According to the Project proposal document, (November 2018), total cost for construction is estimated to be Tsh. 102,350,000,000. The Loan payback time is estimated to be 23 years, with a grace period of 5 years after completion of the project construction. The annual income is estimated to range from Tshs 17,034,900,000 in the first year of operations to Tshs 146,398,452,805.72 in the 29<sup>th</sup> year of the project, which corresponds to 28<sup>th</sup> years of operation. It is expected that, the university will be able to admit students to its maximum capacity after the first 5 years of operation, the period, which will coincide with the commencement of loan repayment. Loan repayment rate will be Tshs 10,171,000,000 per year, which represents a range of 10% to 52% of the accrued income.

#### **9.2 Benefits related to the project**

Several benefits are associated with the proposed development both at local and national level in terms of revenue generation and the multiplier effects associated with linkages with local and national economy.

##### **9.2.1 Benefits to MJNUAT**

In the long run all proposed projects are going to generate income to MJNUAT. The cumulative revenue over the operation period of 28 years is TShs 2,424,198,414,915; while cumulative costs, which include operational costs, investment costs, maintenance costs, as well as loan repayment, amount to TShs 1,413,298,239,159 over the same period. The analysis has considered and incorporated all the matters related to social and environmental adverse impacts. The Benefit-Cost ratio was computed to be 1.71, implying the project to be economically viable. MJNUAT'S financial capacity and sustainability are going to improve by far. Further, the improved financial standing is not only going to promote enrolment but also good governance and efficient running of

the University. Teaching, Research and Public Service and its envisioned center of excellence in knowledge and dissemination to a wide spectrum of beneficiaries at national and regional levels are going to be fully realized. The project will also have several intangible benefits to MJNUAT which include improving the university's image.

### **9.2. 2 Benefit to the Neighbourhood**

During and after construction phase the project is going to provide additional employment opportunities for people surrounding MJNUAT campus related to operation and maintenance. The University will also create business opportunities in vicinity of the campus. Business opportunities will be supporting government initiatives to create employment opportunities for Tanzanians and to meet the target of creating 1 million jobs per year as targeted by the current Government. Notwithstanding that at the moment salaries are yet to be specified, it is envisaged that from employment, workers will get incomes, which will improve quality of their lives and perhaps improve their lifestyles. However, employment opportunities and income from salaries provided will extend beyond the workers and benefits many other people including dependents.

Nevertheless, employment opportunities and the benefits therein will depend on whether suitably qualified local personnel that can take up positions are available. Capacity building therefore is a prerequisite for these benefits to be realized. Alongside capacity building, there shall be a need for putting in place deliberate policies that would compel developers in the real estate economic sector to employ local labour with the requisite skills and experience.

### **9.2.3 Benefit to the Government**

In the long-run, MJNUAT's financial dependence on the government is relatively going to decrease following its improved financial capacity and sustainability resulting from earnings from the envisioned projects.

The government will have the opportunity to use the share of the budget which was supposed to go to MJNUAT for other government development plans. Further the ability of MJNUAT in contributing towards the realization of National Policies such as Education Reforms through expansion of enrolment of students into various degree programme is going to increase.

### **9.3. Costs related to the project**

The estimated costs for implementing enhancement measures, impact management as well as monitoring process as outlined in Chapters 7 and 8 is about Tshs 1,335,000,000. Since some of the impacts will only to be realized during construction phase, the costs



for these will also be short term, especially if mitigation measures are fully implemented.

#### **9.4 Project cost benefit analysis**

As it has been mentioned in Chapters 6 – 8, the potential benefits of the project, in terms of financial and social benefit are substantial. The environmental impacts are reasonably mitigatable and the financial resources needed to mitigate negative impacts, when compared to the required investment are relatively small. However, the benefit cost ratio concluded the project to have more benefits compared to the total cost of the project, this implies that the project is viable and the proponent is encouraged to develop it.

## CHAPTER TEN

### 10.0 DECOMMISSIONING AND CLOSURE PLAN

Decommissioning is a stage the project or activity of the project is formally ending. The Regulations for Environmental Impact Assessment (URT, 2005 and its Amendments of 2018 direct developers to address the implications of the decommissioning process as part of the ESIA process.

As the project involves a construction of a university the actual decommissioning that is, phasing out of the project may not happen in the near future. The decommissioning here may mean closing of the project camp after construction.

Several impacts (negative and positive) are likely to occur as result of decommissioning of these activities However, as a pre-condition to effective and comprehensive implementation of the mitigation measures for decommissioning, the developer *must prepare and implement a Closure and Restoration Plan and set aside sufficient funds for post construction reclamation activities.*

As part of the ESMP, the closure plan objectives are set as follows:

- Prevent or minimise adverse long term social and environmental impacts of the project
- Create a self-sustaining ecosystem or alternate land use based on agreed set of objectives;
- Enable all stakeholders to have their interests considered during camp closure;
- Ensure the process of closure occurs in an orderly, cost-effective and timely manner;
- Ensure that the cost of closure is adequately represented in constructors' budget;
- Ensure clear accountability and sufficient resources, for the implementation of the closure plan;
- Establish appropriate indicators for evaluating success of the closure process.

Impacts associated with decommissioning have been described and assessed in chapter 7; Mitigation measures have also been suggested in chapter 8 and management and monitoring plans that cover aspects of mitigation measures associated with

decommissioning has been highlighted in chapter 8 of this report. Some of these impacts include the following:

- Vibration and noise due to demolition of structure, movement of machines and trucks carrying debris.
- Re-vegetation of the mining site.
- Hazards and risks associated with soil pollution and dust
- Reduced incomes/revenue to local communities due to labour lay off.
- Reduction in levels of accidents.

Some of the mitigation measures provided in the chapters 7 and 8 include challenges to deal with laid off labour force because of workers camp closure. The measures to mitigate these impacts have been developed. Similarly, the costs for decommissioning have been estimated and provided.

## **CHAPTER ELEVEN**

### **11.0 SUMMARY AND CONCLUSION**

#### **11.1 SUMMARY**

This report is about ESIA for the proposed Mwalimu Julius K. Nyerere University of Agriculture and Technology establishment. MJNUAT will entail to construct: (i) College of Agriculture, (ii) School of Agricultural and Bioprocessing Engineering and Technology, and (iii) School of Business and ICT Studies, School of Energy and Mining Engineering and Technology; and their supportive academic and administrative entities. The University Campus will be established in an area of 231.915 hectares and is expected to accommodate 6,800 students and 952 members of staff.

Generally, the project benefits outweigh the costs. However, significant adverse impacts must be addressed to enhance positive and make this project sustainable. Significant adverse impacts are likely to occur during construction, operation and decommissioning of the project. The developed ESMP will be used as a tool to mitigate these impacts. There should also be a close monitoring during the entire period of project implementation.

#### **11.2 CONCLUSION**

Generally, the Environmental and Social Impact Assessment conducted has revealed potential positive impacts of the Project in terms of generating employment, well-trained experts in science and technology, enhanced income generation opportunities and improved landscape and scenic value of the place. However, for the project to be sustainable, the identified significant negative impacts must be eliminated or reduced as presented in Chapter 7. Other mitigation measures include:

- i. Development of the University infrastructures must include the requisite waste disposal or handling systems.
- ii. Stakeholders such as Private Sector, NGO's. Community, Butiama District Council and other interested parties should be sensitized and regularly informed on the implementation progress and their respective contribution should be considered.
- iii. Vegetation clearance should be confined to the absolutely necessary part and where possible indigenous trees in the areas should be preserved. In case some trees will be removed, a plan for replacement shall be designed.
- iv. The Mugango/Kiabakari/Butiama water supply system should be implemented as soon as possible to provide reliable water supply for the university compound;
- v. Employment and training opportunities should be gender inclusive and accommodate people with special needs.

- vi. The recommended mitigation measures should be implemented to reduce significant environmental impacts.

## REFERENCE

1. Feasibility Study, Detailed Design, Preparation of Tender Documents and Construction Supervision for Mugango/ Kiabakari/ Butiama Water Supply-Phase 1 November 2015;
2. HEET project proposal (MJNUAT 2019)
3. Butiama district profile October 2013;
4. Environmental Impact Assessment and Audit (Amendment) Regulations, 2018;
5. The Environment Impact Assessment & Audit Regulations, 2005 Gn No.349 of 2005
6. URT 2004, The National Environmental Management Act, No. 20 of 2004;
7. URT, 1999. Land Act;
8. The National Land Policy (URT, 1995);
9. The National Water Policy (URT, 2002);
10. The National Environmental Policy (URT, 1997)
11. National Education and Training Policy; 2014
12. National Research and Development Policy 2010
13. The Construction Industry Policy (URT, 2003)
14. Sustainable Industrial Development Policy URT 1996
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16. National Health Policy (URT 2007)
17. The National HIV/AIDS Policy (URT 2001)
18. National Energy Policy (URT 2003)
19. National Science and Technology Policy (URT 1996)
20. National Gender Policy (URT 1999)
21. UNDP (2002); United Nations Environment Programme UNEP Division of Technology, Industry and Economics Economics and Trade Branch; Environmental Impact Assessment Training Resource Manual
22. URT 2003, Construction Industry Policy (URT 2003);
23. URT, 1982. Local Government Act (District and Urban Authorities) No. 7 and 8;
24. URT, 1984. The National Land Use Planning Commission Act No. 3 of 1984;

**APPENDICES**

**Appendix Number 1: Signatures of Relatives who Received Graves Relocation Funds**

**PART II - VALUATION SUMMARY AND DETAILED VALUATION**

**MUHTASARI WA FIDIA - KITABU CHA IKOROKOMYO, KIJJI CHA BUTIAMA, WILAYA YA BUTIAMA**

SN	KUMB. No.	JINA LA MWENYE MALI	MAHALI	IDADI YA MAKABURI	FIDIA STAHILI (TShs.)	NAMBA YA CHEKI	TAREHE YA MALIPO	SAINI / DOLE GUMBA
1	VAL/COMP/BTM/BTM0001	VICTORIA PAULO LUCAS	BUTIAMA	5	2,000,000.00	—	05/12/2023	
2	VAL/COMP/BTM/BTM0002	KONZELA WATANDA BURERWA	BUTIAMA	1	400,000.00	—	05/12/2023	

Jumla ya Fidia Stahili, TShs. 2,400,000.00

Saini ya Mthamini Kiongozi Saini ya Afisa Mtendaji wa Kata Saini ya Mtendaji wa Kijiji / Mtaa

Imepitishwa na Mthamini Mkuu Kamishna wa Ardhi / Afisa Ardhi mteule Saini ya Mkuu wa Wilaya

Saini ya Mhasibu Milipaji

**MTHAMINI MTEULE - MARA**

**MKUU WA WILAYA BUTIAMA**

**AUFISA MTENDAJI KATA YA BUTIAMA 24.11.2023**

**AUTHOIRISED OFFICER**

**Appendix 2: Picture of Family 1 with a Poster Showing Valuation Number**

**HATI ZA FIDIA**

MCHANGANUO WA MALIPO KWA ENEO LINALOTWALIWA KWA AJILI YA KUPISHA UJENZI WA CHOO CHA CHUO CHA KUMBUKUMBU YA MWALIMU JULIUS KAMBARAGE NYERERE KIJJI CHA BUTIAMA, MKOA WA MARA.

SN KUMB. No.  
1 VAL/COMP/BTM/BTM0001

Mahali  
BUTIAMA

Jina la Mmiliki  
VICTORIA PAULO LUCAS

2,000,000  
Jumla ya Fidia Stahili

Maelezo ya Jumla

KABURI (5) TU, HAZUJAJENGEWA.


JUMLA YA FIDIA STAHILI 2,000,000



**Taarifa za Makaburi**

Jina la Marehemu	Maelezo	X Coordinate	Y Coordinate	Gharama ya Ufukuaji	Usafiri	Kuzika Unya Na Kujenga	Kifuta Machozzi	Masuala ya Mla Na Dini	JUMLA
PAULO LUCAS MAJARA	HALIJAJENGEWA			0.00	0.00	0.00	400,000.00	0.00	400,000.00
NYAMAMAMBA PETRO	HALIJAJENGEWA			0.00	0.00	0.00	400,000.00	0.00	400,000.00
NYANGUNJA NYAMUGAM	HALIJAJENGEWA			0.00	0.00	0.00	400,000.00	0.00	400,000.00
NYANDALO PAULO LUCA	HALIJAJENGEWA			0.00	0.00	0.00	400,000.00	0.00	400,000.00
NYAMUSIBA PAULO LUCA	HALIJAJENGEWA			0.00	0.00	0.00	400,000.00	0.00	400,000.00

**Appendix 3: Picture of Family 2 with a Poster Showing Valuation Number**

HATI ZA FIDIA		Taarifa za Makaburi									
MCHANGANUO WA MALIPO KWA ENEO LINALOTWALIWA KWA AJILI YA KUPISHA UJENZI WA CHOO CHA CHUO CHA KUMBUKUMBU YA MWALIMU JULIUS KAMBARAGE NYERERE KIJILI CHA BUTIAMA, MKOA WA MARA.		Jina la Marehemu	Maelezo	X Coordinate	Y Coordinate	Gharama ya Ufikuzaji	Usafiri	Kuzika Ujya Na Kujenga	Kifuta Machizi	Masuala ya Mla Na Dini	JUMLA
SN 2	KUMB No. VAL/COMP/BTM/0002	ZUGA CHARLES BODI	HALIJAJENGEWA			0.00	0.00	0.00	400,000.00	0.00	400,000.00
Mahali BUTIAMA  Jina la Mmiliki KONZELA WATANDA BURERWA  400,000 Jumla ya Fida Stahili											
Maelezo ya Jumla											
KABURI (1), HALIJAJENGEWA.											
JUMLA YA FIDIA STAHLI		400,000									



**APPENDIX: TITTLE 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 105



LAND REGISTRY,  
P.O Box 1191,  
Dar es salaam.  
Date: 02 Sep, 2020

MWALIMU JULIUS K NYERERE UNIVERSITY OF AGRICULTURE AND  
TECHNOLOGY  
P.O Box P.O.Box 976 MUSOMA  
BUTIAMA  
Sir/Gentlemen/Madam,

RE: TITLE NO: 105 LAND OFFICE NO: 619005  
PLOT NO. 1 BLOCK F AT BUTIAMA

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

*Asst.* REGISTRAR OF TITLES

Copy to: Commisioner for Lands  
Your LD File No: BDC/LD/BTM/006 refers

LEADUP SECTION 27

Date of Issue:

Title Number: 105 MRLR

Land Office Number: 619005

Land: PLOT NO.1 BLOCK 'F' BUTIAMA, BUTIAMA DISTRICT COUNCIL

Term: NINETY NINE YEARS